

SOLUTIA - 152

Kenneth Bardo

03/01/04 03:08 PM

To: sdsmith@solutia.com
cc: rjhill1@solutia.com, bsyare@solutia.com, rswill@solutia.com
Subject: Contacts

I sent this attachment to Gary today and later found out that he is know longer the project manager. Solutia needs to be more timely in notifying me of any contact changes. Also, in the future, only the designated Solutia project manager should initiate any calls regarding meetings, comments, etc. If you would like to meet, the new designated Solutia project manager can contact me at bardo.kenneth@epa.gov or at (312) 886-7566 with a propsed agenda and date.

Attached are EPA comments on the DNAPL Workplan. Our expectations are that all work, including submittal of the CMS for DNAPL, is due no later than August 27, 2004.



Solutia DNAPL Workplan Comments.wpd

EPA Comments on DNAPL Characterization and Site Corrective Measures Study Workplan, Solutia Inc., February 18, 2004

1. EPA notified Solutia Inc. on November 4, 2003, that it was apparent that DNAPL was an issue at the Solutia facility. At that time, Solutia was undertaking DNAPL investigations at the adjacent CERCLA Sauget Area 1 Sites but had not specifically proposed or discussed the need to undertake similar DNAPL investigations at the Solutia facility pursuant to the RCRA Consent Order. In our November 5, 2003 letter, EPA provided its own evaluation of bedrock topography and chlorobenzene concentrations in groundwater as related to potential DNAPL presence, based on existing information presented in Solutia reports.

The approximate three and one-half months Solutia has taken to submit a workplan to undertake DNAPL investigations has seriously impacted Solutia's ability to submit the required Final Corrective Measures Proposal due on June 1, 2004. In our December 12, 2003 meeting, it was our understanding that the DNAPL workplan for the CERCLA Sauget Area 1 Sites would be used to investigate the Solutia facility. An addendum to the workplan would be submitted to EPA in early-January that specifically delineated the sampling locations. With this timeframe, DNAPL investigations for Sauget Area 1 Sites and the Solutia facility were on track for initiation in mid-January, with completion in June 2004, the same time that the Final Corrective Measures Proposal was due.

To complete the DNAPL evaluation in a timely manner and ultimately, the final corrective measures, Solutia must initiate the work and schedule outlined in the DNAPL workplan immediately upon receipt of these comments, with completion of the work no later than August 27, 2004.

2. Ensure that the 3-D seismic reflection surveys cover the east-west length and north-south width of the Solutia facility and, if possible, extend off-site west of Lot F and/or south of the facility to confirm the boundaries of the known topographic low of the bedrock surface.
3. It is our understanding that the pipeline corridor was only used to route benzene, a potential LNAPL. Therefore it does not seem useful to investigate this area for DNAPL (Task 4). In the alternative, more useful

information for Task 4 would be obtained by investigating the areas where historical data presented in Table 1 shows the greatest potential for DNAPL (i.e., GP-4A/B, GM-13, GP-19A/B, and SCT). There was also over 59,000 pounds of chlorobenzene released to the subsurface in 2000 and 2001 in the chlorobenzene process area and DNAPL would be expected. Another potential DCB source area exists in the Eastern Plant Area in the vicinity of G-102 and CA-3 that should be investigated under Task 4. Ensure that the proposed Task 4 soil boring/piezometer locations consider these likely and potential DNAPL areas.

4. Specific soil boring/piezometer locations for DNAPL investigation currently depicted in Figure 3 should be appropriately located based on the results of Tasks 2 and 3, and consideration of historical data in Table 1 (see Comment #3). The current locations are only preliminary and must be refined and supported based on data from the DNAPL survey of existing wells and the geophysical survey. Off-site locations to the west and south may also need to be considered based on the results of Task 3 and preferential migration pathways following the bedrock surface topography.
5. In similar DNAPL investigations at another facility, vial test kits containing Sudan IV dye were found to be the most useful for qualifying DNAPL in soil samples. In that case, a pre-measured mass of Sudan IV dye was dissolved in a sugar cube in a vial. A measured volume of soil and water was added and agitated until the sugar dissolved. The hydrophobic dye stained DNAPL red. In addition, another hydrophilic dye was added to stain the water green and make the red dye more visible. The kits were available from Cheiron Resources Ltd. of Calgary, Alberta, Canada.
6. The *Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action*, EPA/530/R-01/015, September 2001 provides and explains EPA policies on protecting and cleaning up groundwater at RCRA corrective Action facilities. Ensure that this guidance is used in undertaking the DNAPL investigations and corrective measures study.

7. Include *In-Situ* Bioremediation as a potential corrective measure in Task 8. DNAPL may not be directly treatable by biological methods but increased biological activity could enhance the removal of DNAPL by increasing concentration gradients and providing natural surfactants. The natural process of biodegradation (i.e., acclimated bacteria) should be investigated along with enhancement techniques for these natural processes through the addition of amendments (e.g., nutrients, organic substrates) to manage subsurface conditions. Investigate analytical parameters indicative of biological activity (e.g., heterotrophic plate counts, presence of degradation products, bicarbonate, ammonia, dissolved iron, manganese, sulfide).

~~APPENDIX B-3~~

~~SURFACE WATER SAMPLE LOG SHEETS~~

SOLUTIA - 153



LETTER OF TRANSMITTAL

From: Steve Smith
575 Maryville Centre Drive
St. Louis, MO 63141
(314) 674-4660 FAX (314) 674-8957

Date: 3-9-04

The following items are:

☒ Enclosed ☐ Requested ☒ Sent Separately Via: **e-mail** _____

No. of Copies	Description
1	Tech Memo
1	Table 1
1	Figures 1 - 10

The above items are submitted:

☒ At your request ☐ For your review ☐ For your signature
☐ For your files ☐ For your action ☐ For your information

Comments:

By: Jorge Garcia

Garcia, Jorge Y

From: Smith, Steven D
Sent: Monday, March 08, 2004 5:38 PM
To: Nabil Fayoumi (fayoumi.nabil@epa.gov); Ken Bardo (bardo.kenneth@epa.gov); Sandra Bron (Sandra.Bron@epa.state.il.us); Peter Barrett (pbarrett@CH2M.com)
Cc: Williams, Richard S; Yare, Bruce S; Garcia, Jorge Y
Subject: FW: WGK - Groundwater Migration Control Tech Memo

Nabil;

Attached are the Tech Memo, Data Table and Figures demonstrating that the Sauget Area 2 Groundwater Migration Control System maintained a hydraulic trough upgradient of the Mississippi River along the entire length of Sauget Area 2 Site R when surface water levels were falling and rising in February 2004. This is the hydraulic control information we promised to send during our last call.

We plan to switch back to the ROD approved look-up tables for determining pumping rates during the wall construction. Also we plan to continue monitoring groundwater levels during March 2004. We can discuss further on our call tomorrow.

Steve



GW Control Tech
Memo.doc (46 K...



trough.xls (23 KB)



Solutia final figs
3-8-04.zip ...

DATE: March 8, 2004**cc:** Richard Williams/ R.S Williams
Steve Smith / Solutia**SUBJECT:** Sauget Area 2 GMCS
Groundwater Control**TO:** Bruce Yare

Groundwater level data were collected from piezometers and monitoring wells at the Sauget Area 2 Site R Groundwater Migration Control System (GMCS) between February 12 and 26, 2004 to assess whether or not groundwater downgradient of Sauget Area 2 Site R was controlled by the GMCS. Groundwater level measurements were automatically recorded in four piezometer pairs (PZ-1E/W, PZ-2E/W, PZ-3E/W and PZ-4E/W) and three pumping wells (EW-1, EW-2 and EW-3) as part of normal GMCS operation. Manual groundwater-level measurements were made on February 12, 16, 17, 19, 20, 23, 24, 25 and 26, 2004 in six monitoring wells (B-21B, B-25B, B-26B, B-28B, B-29B, and GM-27B) screened in the Middle Hydrogeologic Unit. Surface water levels from a river stage gage at the ABRTF diffuser were also automatically recorded. Piezometer and monitoring well locations are shown on Figure 1, and groundwater and surface water level data are presented in Table 1.

These data were used to generate a groundwater and surface water level elevation map for February 12, 16, 17, 19, 20, 23, 24, 25 and 26, 2004 (Figures 2 through 10). Each daily groundwater and surface water elevation map was evaluated to determine whether or not pumping from the GMCS created a hydraulic trough (groundwater low) upgradient of the Mississippi River along the full length of Sauget Area 2 Site R. If the GMCS maintained such a hydraulic trough, groundwater discharging to the Mississippi River downgradient of Site R would be controlled.

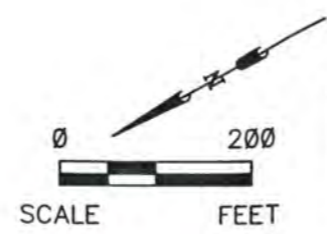
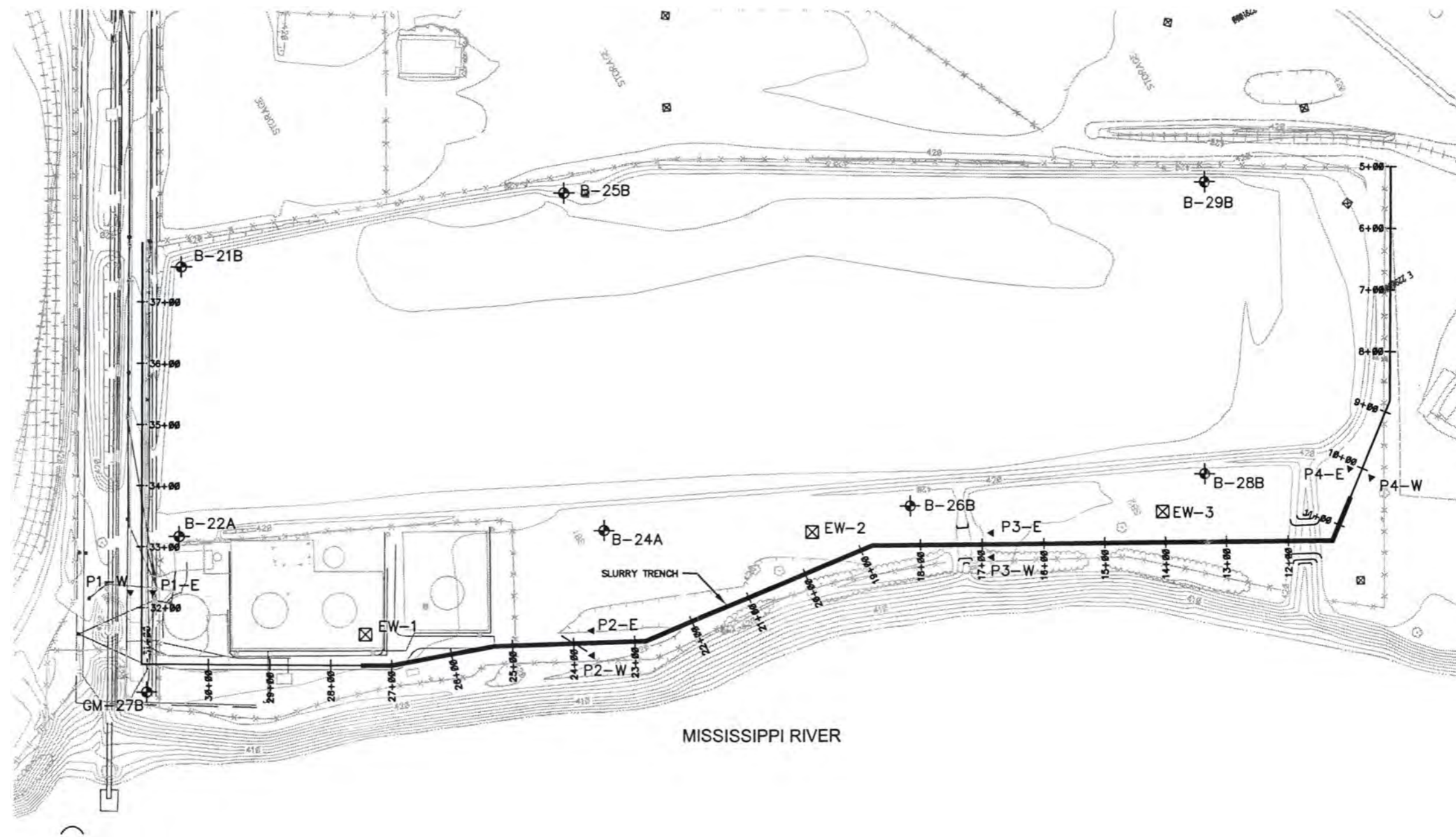
As shown on Figures 2 through 10, a hydraulic trough, centered on GMCS pumping wells EW-1, -2 and -3 and extending the entire length of Site R, was present upgradient of the Mississippi River. This trough was maintained during periods of falling surface water levels (February 12 to 20) and rising surface water levels (February 21 to 26). The presence of a hydraulic trough upgradient of the Mississippi River indicates that groundwater migrating downgradient of Site R was under control.


Table 1
Groundwater and River Stage Elevation
at the Sauget Area 2 Site-R
Sauget, Illinois

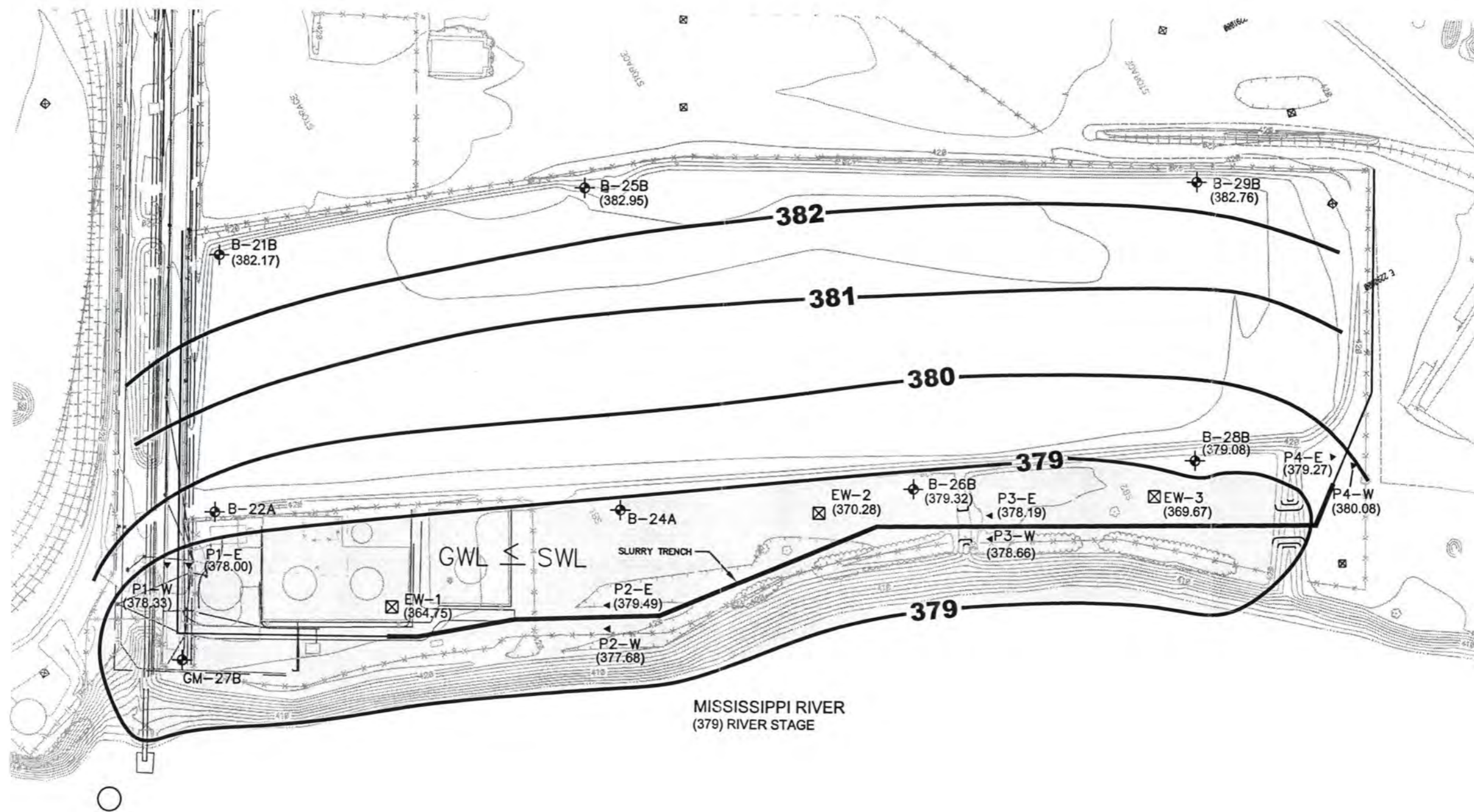
Date	PZ-1E	PZ-2E	PZ-3E	PZ-4E	PZ-1W	PZ-2W	PZ-3W	PZ-4W	B-21B	B-25B	B-26B	B-29B	B-28B	GM-27B	EW1	EW2	EW3	RS
12-Feb-04	378.00	379.49	378.19	379.27	378.33	377.68	378.66	380.08	382.87	382.95	379.32	382.76	379.08	na	364.75	370.28	369.67	379.00
16-Feb-04	377.94	379.24	378.02	379.17	378.26	377.70	378.68	380.01	382.67	382.75	379.12	382.66	378.98	na	365.02	375.08	369.70	378.96
17-Feb-04	377.73	379.05	377.88	378.99	378.05	377.35	378.38	379.81	382.77	382.65	379.12	382.56	378.78	na	364.75	374.84	369.59	378.39
19-Feb-04	377.73	379.18	378.15	379.14	378.06	377.33	378.46	379.95	382.67	382.75	379.22	382.76	379.28	na	365.08	374.86	369.51	378.24
20-Feb-04	377.63	378.96	377.85	378.93	377.90	377.31	378.38	379.78	382.67	382.55	379.12	382.66	379.18	na	364.86	374.48	368.75	378.80
23-Feb-04	379.16	379.58	378.46	380.14	379.18	379.93	380.68	380.66	382.87	382.55	379.22	382.66	379.58	382.04	366.23	374.76	370.18	383.36
24-Feb-04	379.76	379.96	378.76	380.58	379.53	380.75	381.09	380.50	382.97	382.65	379.32	382.66	379.68	382.84	366.83	374.91	370.74	384.93
25-Feb-04	379.80	380.08	378.91	380.67	379.58	380.62	380.93	380.58	383.37	382.85	379.52	383.06	379.98	382.44	366.85	375.09	370.91	384.50
26-Feb-04	380.45	380.31	379.15	381.14	380.18	381.93	382.16	381.13	383.47	382.85	379.62	383.16	380.28	383.54	367.47	375.27	371.15	386.53

Note: Groundwater data from monitoring wells with "B" and "GM" designation were collected manually, daily. Remaining data were automated collected, data is presented as average daily data.

RS = River Stage
na = not available



 <p>SOLUTIA INC. 575 MARYVILLE CENTRE DRIVE ST. LOUIS, MO. 63141 Applied Chemistry, Creative Solutions</p>	<p>GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS</p> <p>Site Layout</p>	<p>PROJECT NO.</p> <p>FIG. NO. 1</p>
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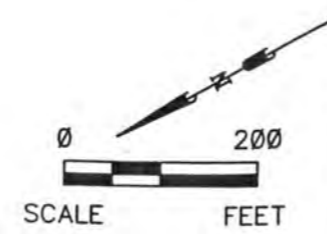


LEGEND

-379- GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH
— TRENCH WALL ALIGNMENT
— HYDRAULIC TROUGH

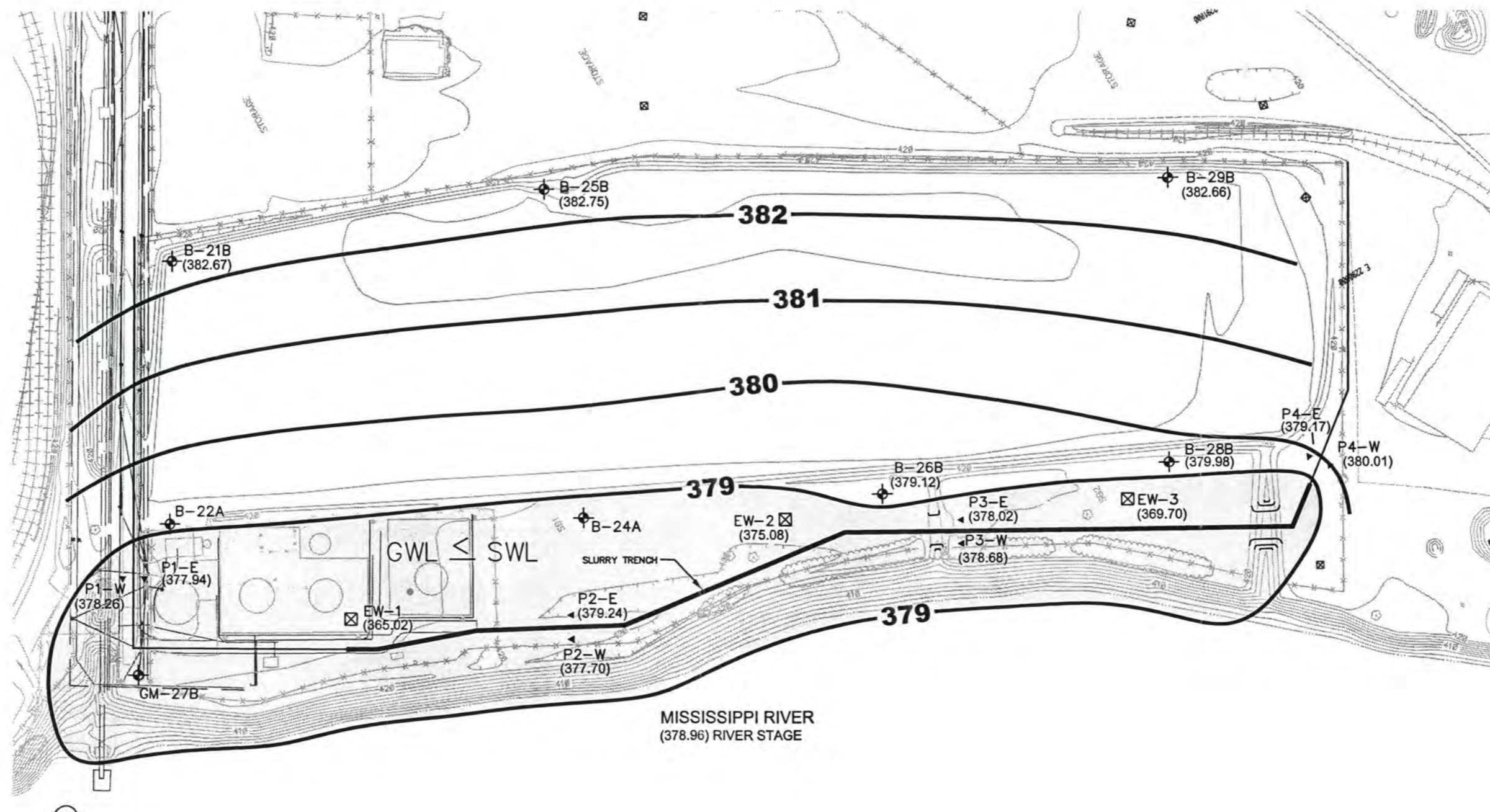
GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation February 12, 2004	FIG. NO. 2

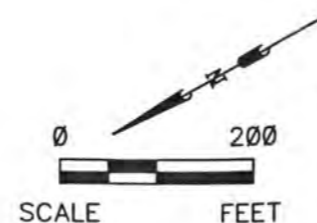


LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH
— TRENCH WALL ALIGNMENT
— HYDRAULIC TROUGH

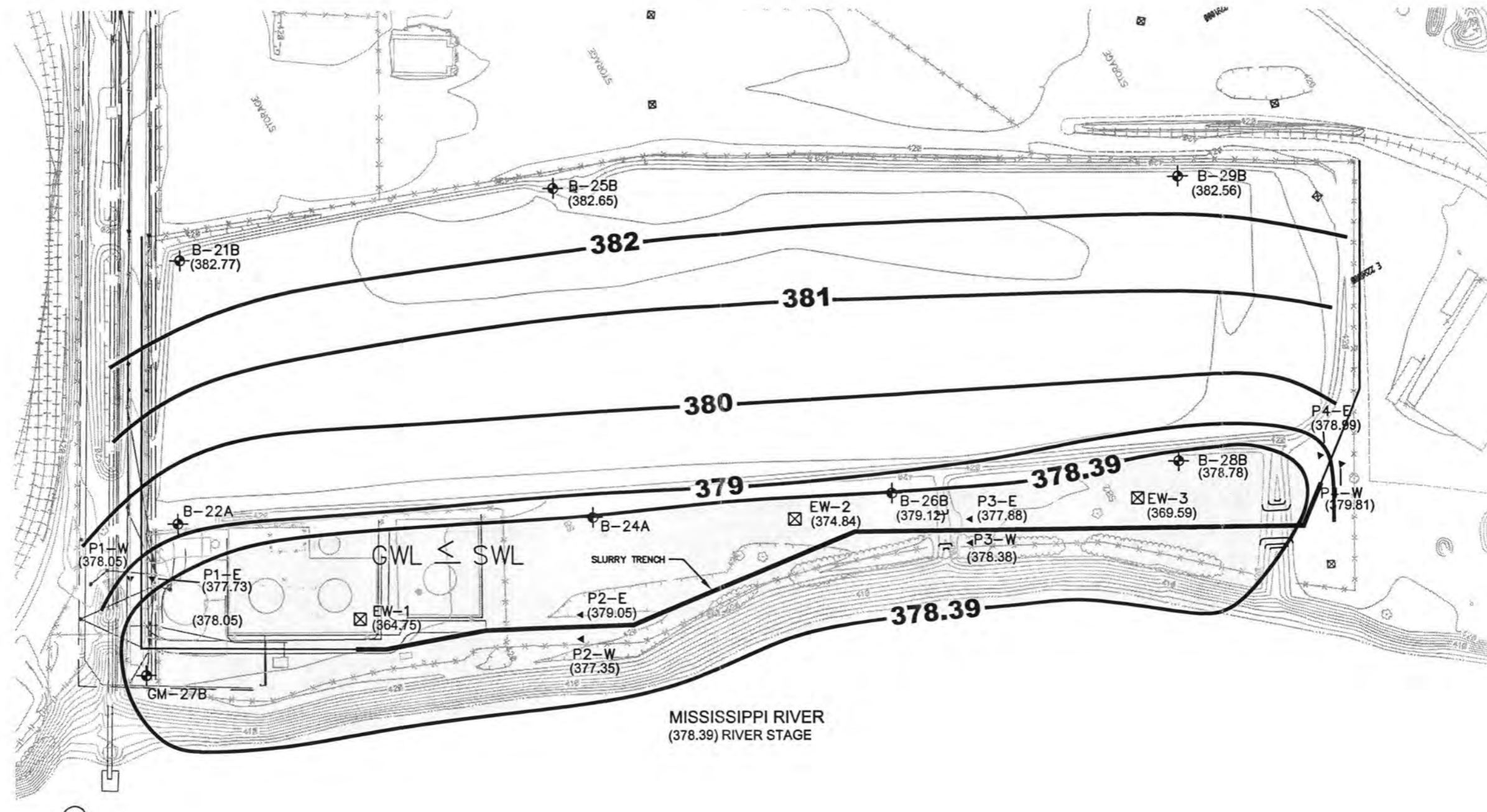
GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation February 16, 2004	FIG. NO. 3



LEGEND

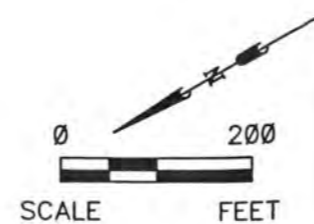
—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

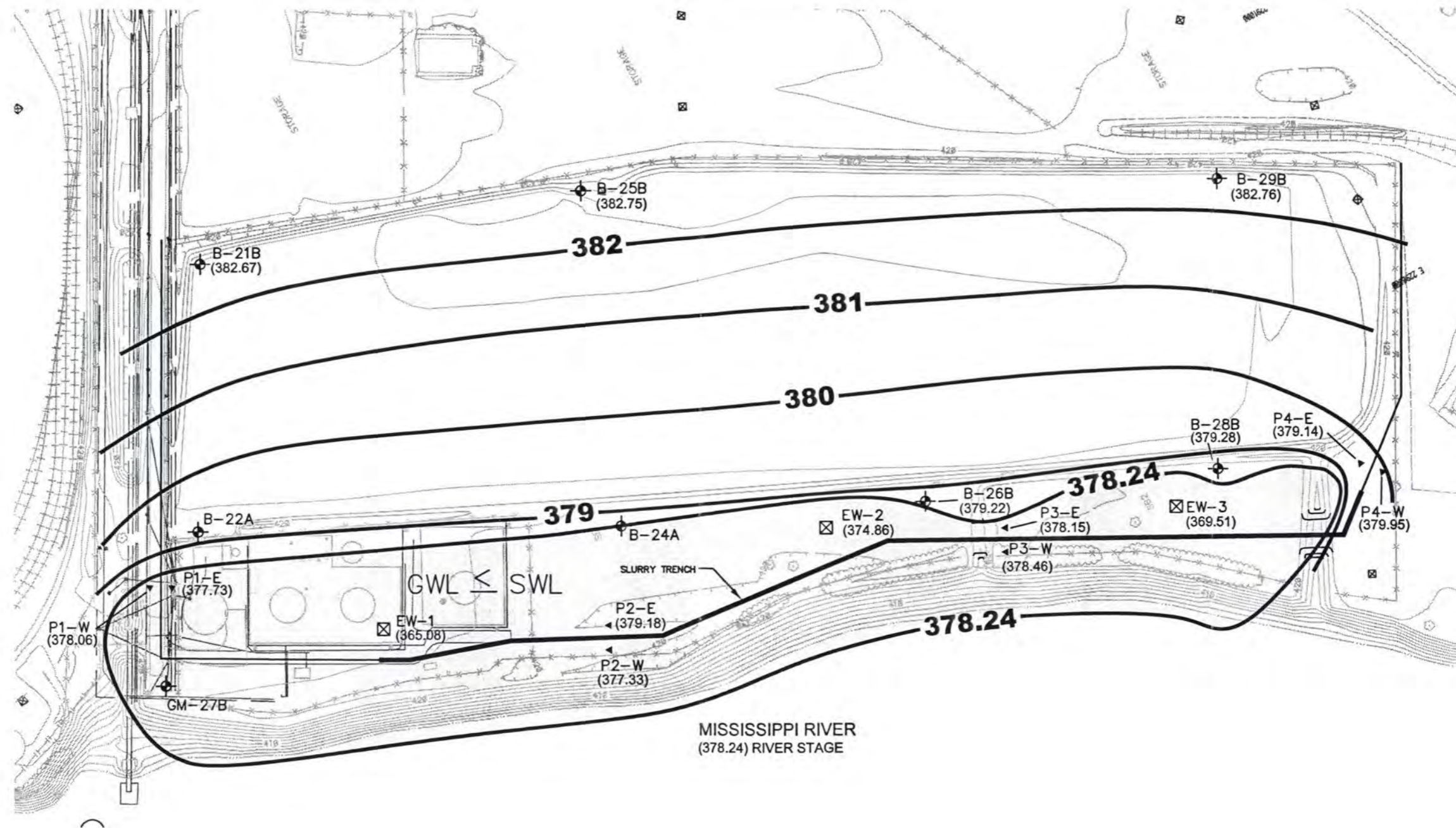
GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS		PROJECT NO.
Groundwater Elevation February 17, 2004		FIG. NO. 4



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

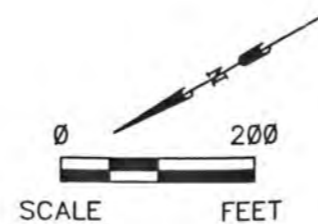
(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

--- HYDRAULIC TROUGH

GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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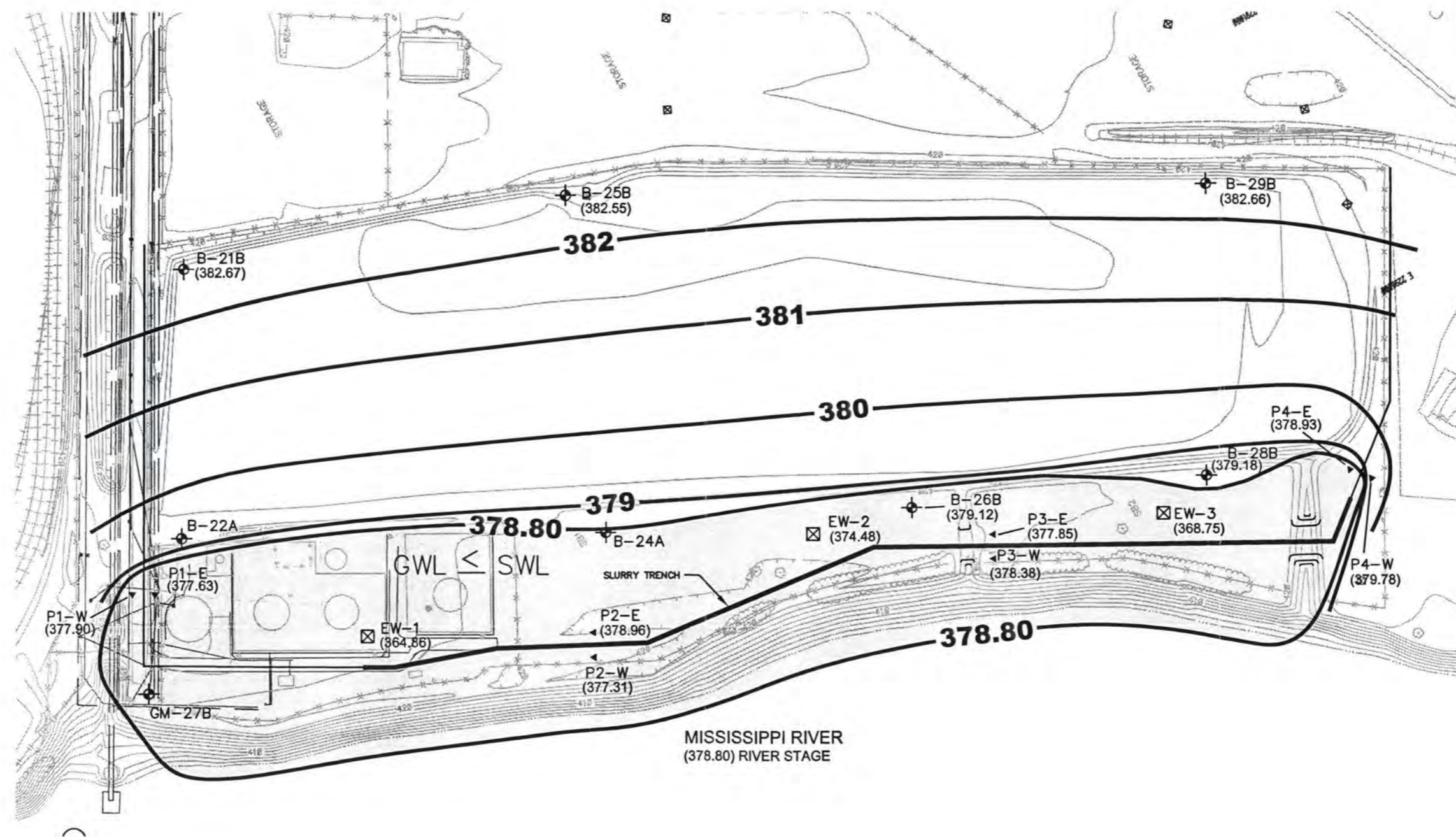
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
February 19, 2004

PROJECT NO.

FIG. NO.

5

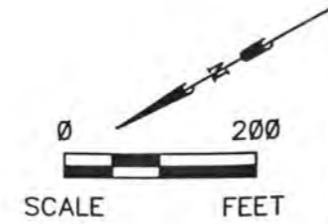



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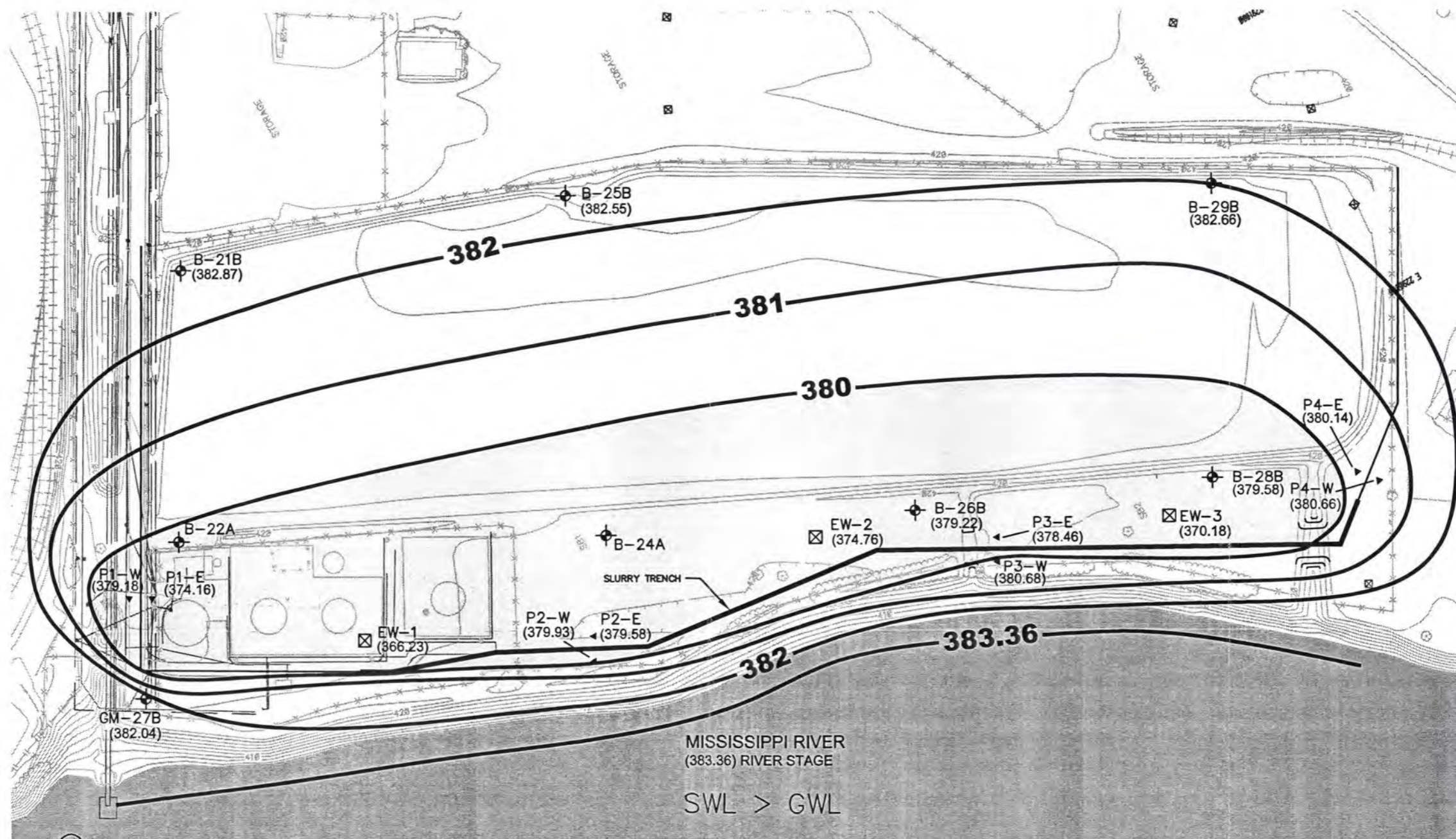
—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH
— TRENCH WALL ALIGNMENT
— HYDRAULIC TROUGH

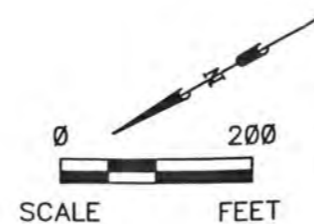
GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



 SOLUTIA™ Applied Chemistry, Creative Solutions	SOLUTIA INC. 575 MARYVILLE CENTRE DRIVE ST. LOUIS, MO. 63141	GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
		Groundwater Elevation February 20, 2004	FIG. NO. 6



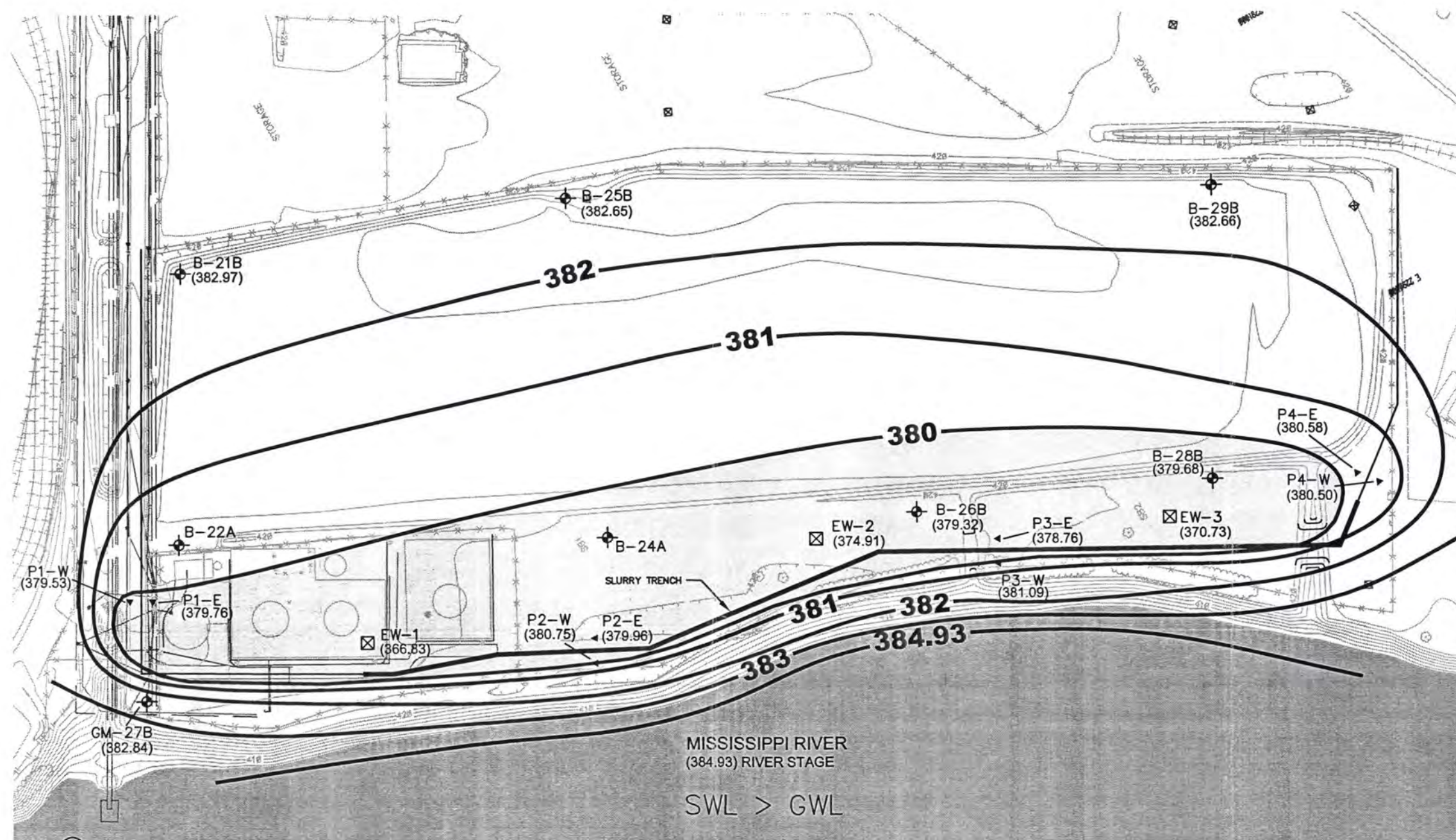
- LEGEND**
- 379—** GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 - (379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL**
 - GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation February 23, 2004	FIG. NO. 7



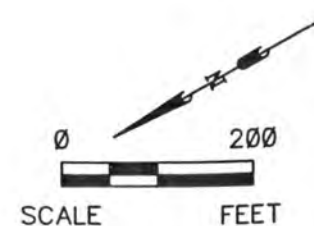
LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH
 — TRENCH WALL ALIGNMENT
 — HYDRAULIC TROUGH

SWL > GWL

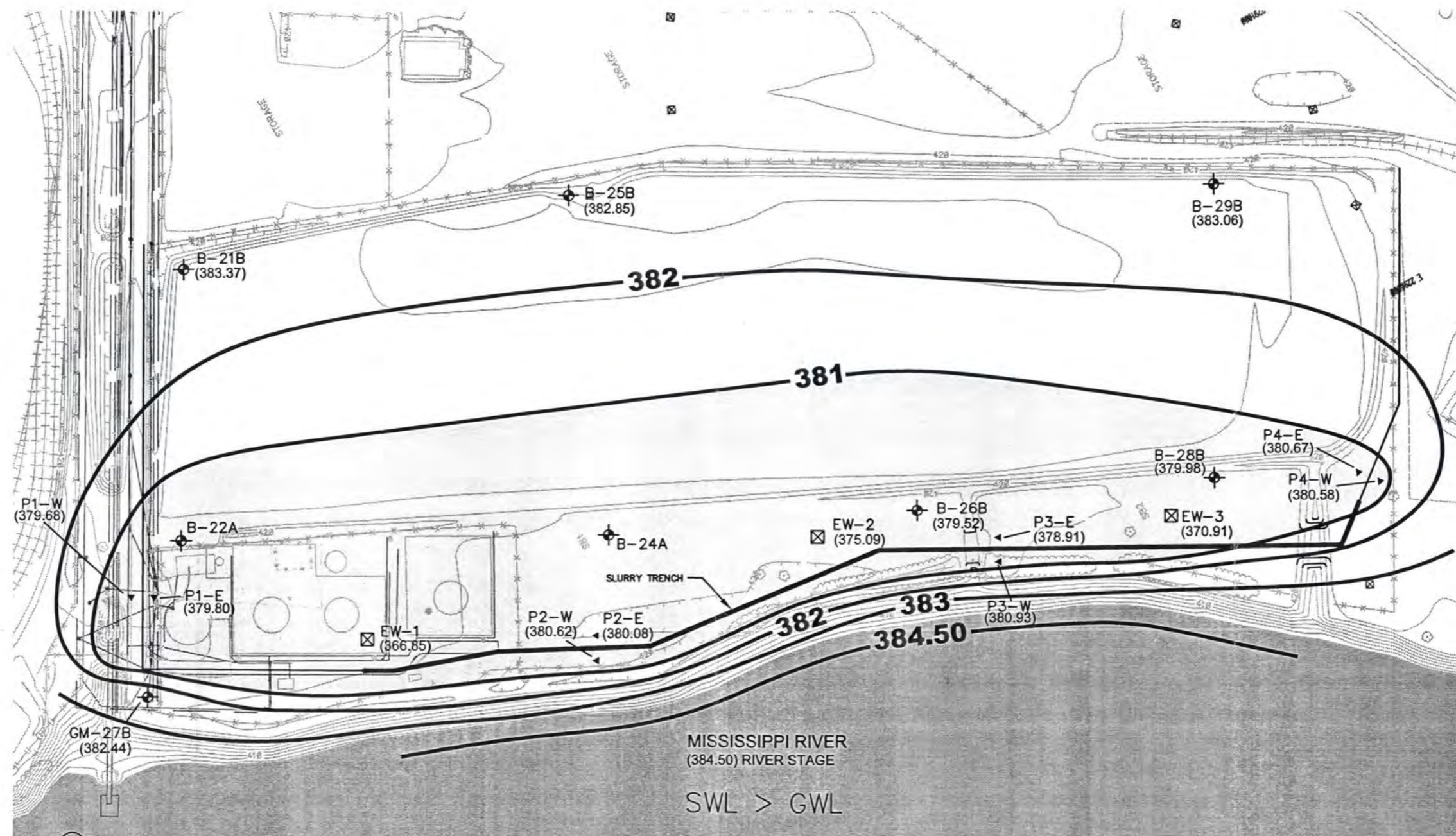
GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



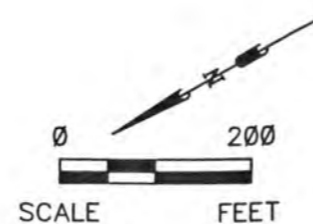
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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation February 24, 2004	FIG. NO. 8



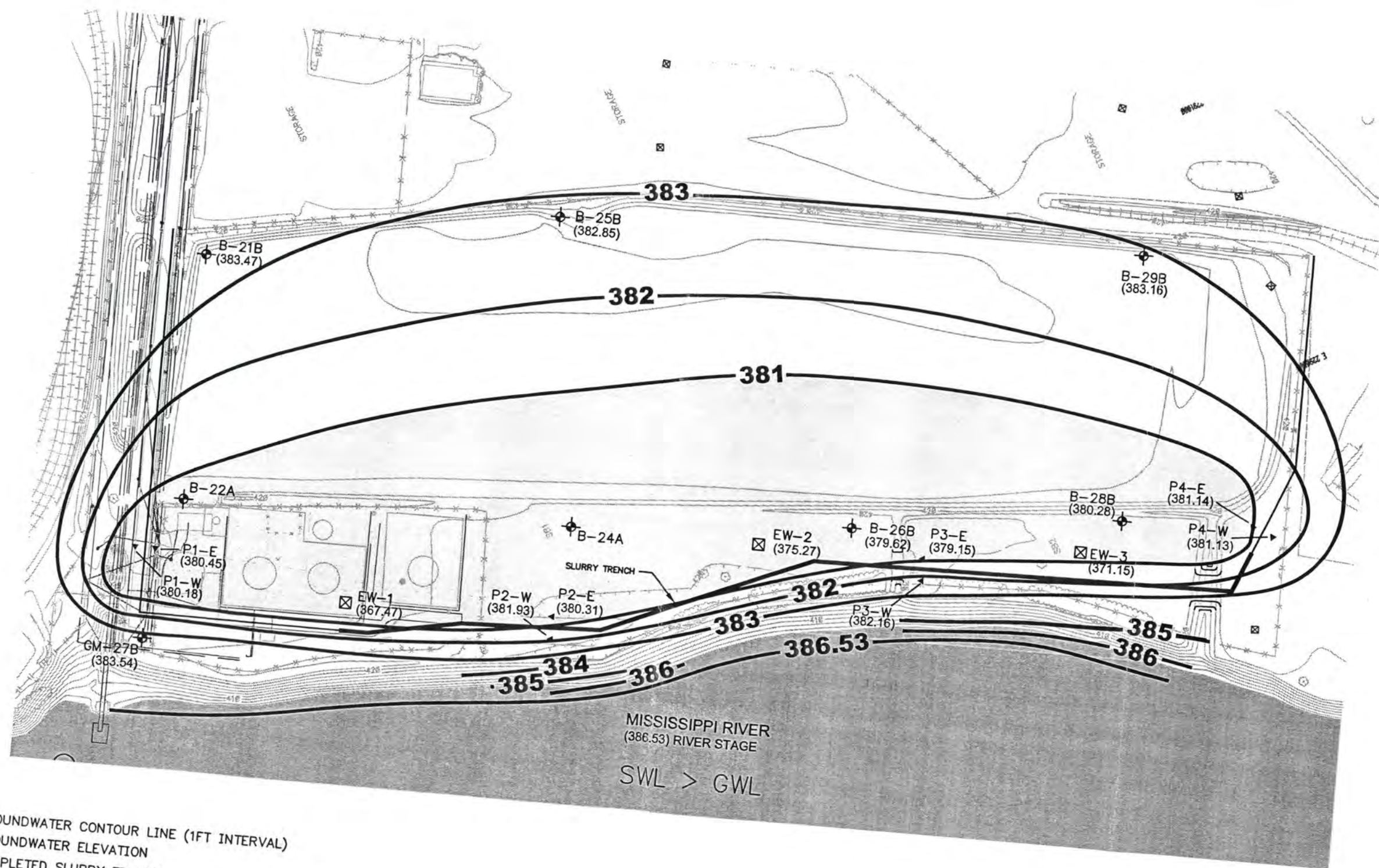
- LEGEND**
- 379—** GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL**
 - GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



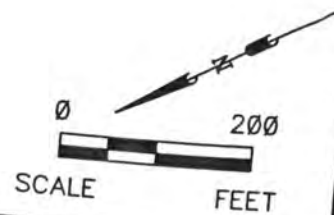
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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation February 25, 2004	FIG. NO. 9



- LEGEND**
- 379-** GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 - (379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL
 - GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM
 SITE-R
 SAUGET, ILLINOIS

Groundwater Elevation
 February 26, 2004

PROJECT NO.

FIG. NO.

~~SEDIMENT SAMPLE LOG SHEETS~~

~~APPENDIX B-1~~

SOLUTIA - 154

March 9, 2004

DE-9J

VIA E-MAIL AND CERTIFIED MAIL
RETURN RECEIPT REQUESTED

7001 1940 0001 4947 7309

Mr. Steven D. Smith
Solutia Inc.
575 Maryville Centre Drive
St. Louis, MO 63141

RE: Notice of Dispute
Administrative Order on Consent
U.S. EPA Docket No. R8H-5-00-003
Solutia Inc.
ILD 000 802 702

Dear Mr. Vandiver:

By this letter, the United States Environmental Protection Agency (U.S. EPA) serves notice of dispute pursuant to Section X.2 of the Resource Conservation and Recovery Act (RCRA), Administrative Order on Consent (AOC), U.S. EPA Docket No. R8H-5-00-003, effective May 3, 2000, because U.S. EPA believes that Solutia Inc. (Solutia) is in violation of the AOC and is therefore liable for penalties.

Background

In our letter of December 17, 2001, U.S. EPA set forth an integrated approach using Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and RCRA authority to address the discharge of contaminated groundwater to the Mississippi River. Under this approach, U.S. EPA would issue an interim action Record of Decision (ROD) to select a remedy to be used to stabilize the migration of contaminated groundwater at or from the Solutia facility. A CERCLA Unilateral Administrative Order (UAO) to implement the ROD was issued on September 30, 2002, and required construction of the selected remedy to be completed within eight months of the effective date of the UAO.

The selected remedy in the CERCLA UAO consists of a 3,500-foot long "U"-shaped, fully penetrating, jet grout barrier wall; three partially penetrating groundwater recovery wells capable of pumping a combined total of 303 to 724 gpm; treatment of the extracted contaminated groundwater (the exact treatment design to be determined during the remedial design); monitoring; and institutional controls.

On July 15, 2003 (on or about eight months after the effective date of the CERCLA UAO), the three groundwater recovery wells installed just east of the Mississippi River began pumping contaminated groundwater. However, Solutia's choice to send recovered groundwater to the American Bottoms Regional Wastewater Treatment Facility (ABRWTF) limited the volume of groundwater that could be recovered and treated. The initial pumping rate for the groundwater recovery wells was 73 gallons per minute (gpm). The pumping rate was insufficient, based on Solutia's modeling, to fully capture the contaminated groundwater discharging to the Mississippi River. The maximum pumping rate (approximately 1800 gpm) was not initiated until October 21, 2003, when volume limitations were lifted by the ABRWTF.

The required construction of the jet grout barrier wall between the groundwater recovery wells and the Mississippi River was also delayed and subsequently modified. The jet grout barrier wall plan was replaced by an approach employing the construction of a slurry wall. The modified construction project was not initiated until September 2003.

Solutia stopped construction of the slurry wall in January 2004. Solutia recently stated that if construction were to resume in the future, at least 36 weeks are still required to complete the slurry wall. The slurry wall contractor INQUIP Associates, reports in a February 9, 2004, letter that serious impacts on the stability of the slurry trench may occur with the stoppage of construction, including trench failure.

Solutia is currently maintaining its responsibility for pumping the groundwater recovery wells and sending the recovered groundwater to the ABRWTF. However, groundwater data provided in the CERCLA UAO monthly reports submitted on January 12, 2004, and February 10, 2004, shows that contaminated groundwater has not been stabilized. Piezometers PZ-1S, PZ-2E, PZ-3E, and PZ-4E monitor groundwater levels between the three pumping groundwater recovery wells and the Mississippi River. For approximately 16 days in December 2003, groundwater levels at PZ-2E, PZ-3E, and PZ-4E were 1 to 2-feet higher than the river stage level. In January 2004, groundwater levels at PZ-2E, PZ-3E, and/or PZ-4E were approximately 0.5 to 2-feet higher than the river stage level for 19 days. From February 1 to February 8, 2004, piezometers PZ-2E and PZ-4E had groundwater levels from 0.5 to 2.5-feet higher than the river stage level. Pumping rates on February 6, 2004, were approximately 2225 gpm. The groundwater data shows that complete hydraulic control of contaminated groundwater is not being maintained through pumping of the three groundwater recovery wells and that contaminated groundwater continues to discharge to the Mississippi River.

We conclude that Solutia has not constructed and completed, in a timely manner, the selected remedy required by the CERCLA UAO.

Solutia has also indicated that continuation of the project is in doubt, putting the project's completion in doubt. Finally, Solutia's effort to pump groundwater in the vicinity of the Mississippi River area has not been shown to be effective in stabilizing the Solutia facility groundwater plume. Therefore, Solutia has not adequately demonstrated that it has met the requirement to stabilize contaminated groundwater and control human exposures as required in the RCRA AOC.

Notice of Dispute

The RCRA AOC provides the schedule to stabilize the ongoing migration of contaminated groundwater at or from the Solutia facility. The scheduled date in Section VI.2 of the AOC is January 1, 2002. On December 27, 2001, the U.S. EPA Project Manager granted a 90-day time extension, to April 1, 2002, to stabilize groundwater, as requested by Solutia on November 30, 2001.

Our December 17, 2001, letter described an integrated approach using CERCLA/RCRA authority to address the discharge of contaminated groundwater to the Mississippi River. We stated that compliance with the interim action ROD would satisfy Solutia's obligation pursuant to the RCRA AOC to demonstrate compliance with the environmental indicator for control of migration of contaminated groundwater. However, Solutia has failed to comply and complete construction of the selected remedy within eight months of the effective date of the CERCLA UAO and as of this date, still has not completed construction of the requisite slurry wall. As a result, current data shows that contaminated groundwater continues to discharge from the Solutia facility to the surrounding area and on many days to the Mississippi River.

Section VI.3 of the AOC requires Solutia to demonstrate by January 1, 2004, that all current human exposures to contamination are under control. The incomplete selected remedy and ongoing discharge of contaminated groundwater from the Solutia facility indicate that Solutia has not demonstrated by January 1, 2004, that significant or unacceptable exposures to humans to the contamination continuing to emanate from the Solutia facility do not exist.

Solutia is subject to penalties for its continued violation of the AOC for each day that it fails to adequately demonstrate that contaminated groundwater migration continuing to emanate from the Solutia facility is stabilized and that current human exposures are under control by the due date. Solutia must complete the construction and operation of the selected remedy required by the CERCLA UAO as necessary, to demonstrate that the discharge of contaminated groundwater continuing to emanate from the Solutia facility to the Mississippi River is insignificant and currently

acceptable, and that all current human exposures to such contamination are controlled.

This Notice of Dispute pertains only to Solutia's property and groundwater contamination continuing to emanate from its property during its bankruptcy case. EPA reserves all of its rights with respect to all other violations by Solutia of the AOC and will seek appropriate rulings or make appropriate filings with respect to such violations in the future as appropriate.

Please contact me at (312) 886-7566 to see if this dispute can be informally resolved, as required by Section X.2 of the AOC.

Sincerely yours,

Kenneth S. Bardo

Kenneth S. Bardo, Project Manager
Corrective Action Section

cc: Robert Hiller, Solutia (e-mail)
Richard Williams, Solutia (e-mail)
Bruce Yare, Solutia (e-mail)
Linda Tape, Esq., Husch & Eppenberger, LLC
Jim Moore, IEPA
Gina Search, IEPA

b6
D

SENDER: COMPLETE THIS SECTION		COMPLETE THIS SECTION ON DELIVERY	
<p>1. Article Addressed to: <i>Steve Smith Solutia Inc. 575 Maryville Centre Drive St. Louis, MO 63141</i></p>		<p>A. Received by (Please Print Clearly) <i>[Signature]</i> B. Date of Delivery <i>3-11-01</i></p>	
<p>2. Article Number (Transfer from service label) <i>7001 1940 0001 4947 7309</i></p>		<p>C. Signature <i>[Signature]</i> D. Is delivery address different from item 1? If YES, enter delivery address below:</p>	
<p>PS Form 3811, March 2001</p>		<p>3. Service Type <input checked="" type="checkbox"/> Certified Mail <input type="checkbox"/> Registered <input type="checkbox"/> Insured Mail <input type="checkbox"/> Express Mail <input type="checkbox"/> Return Receipt for Merchandise <input type="checkbox"/> C.O.D.</p>	
<p>Domestic Return Receipt</p>		<p>4. Restricted Delivery? (Extra Fee) <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	

102595-01-M-1424

Solutia NOD

U.S. Postal Service
CERTIFIED MAIL RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

K. Bardo, DEL-9JU SE

Postage	\$ 1.60
Certified Fee	2.30
Return Receipt Fee (Endorsement Required)	1.75
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	\$ 4.65

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CHICAGO IL MAR 9 2001

Sent To *Steve Smith*
Street, Apt. No.;
or PO Box No. *575 Maryville Centre*
City, State, ZIP+ 4 *St. Louis, MO 63141*

7001 1940 0001 4947 7309
See Reverse for Instructions

~~APPENDIX B-5.~~

~~CHAIN-OF-CUSTODY RECORDS~~

SOLUTIA - 155





"Smith, Steven D"
<sdsmit@solutia.com>

03/16/04 08:10 AM

To: Nabil Fayoumi/R5/USEPA/US@EPA, Kenneth
Bardo/R5/USEPA/US@EPA
cc: "Williams, Richard S" <rswill1@solutia.com>
Subject: Flow restriction by American Bottoms

Ken & Nabil:

This email is to advise you that this morning the American Bottoms plant lifted the temporary flow restriction on Site R flow. (Also note there is no evidence to suggest that the upset at American Bottoms was in any way caused by the Site R water.)

Today we will set the pumping flow rate back to the targets set forth in the Record of Decision for the "no-wall" alternate.

Steve

~~APPENDIX B.6~~

~~MONITORING WELL INSPECTION SHEETS~~

SOLUTIA - 158



April 19, 2004

Mr. Ken Bardo
U.S. EPA Region 5
Corrective Action Section
77 West Jackson Blvd
Chicago, IL 60604-3590

RE: Solutia W. G. Krummrich Plant

Dear Ken:

Enclosed is the CA750 Groundwater Migration Under Control Addendum as agreed in our meeting with the Agency on March 17/18, 2004.

This submittal is intended to resolve the March 30, 2004 Notice of Dispute Meeting, Administrative Order on Consent, EPA Docket No. R8H-5-00-003 and demonstrate that hydraulic control of the groundwater contaminant plume has and is being maintained. Specifically, this Addendum includes the following information:

- Water Level and Pumping Rate Data
- Hydraulic Control of Groundwater Migration Demonstration
- Physical Control of Groundwater Migration Demonstration
- Groundwater Control Data Gap Analysis
- Plume Stability Monitoring Plan

If you have any questions or need additional information, please let me know. We would like to schedule a meeting at your convenience to discuss this submittal and define any follow up that is needed to further demonstrate that groundwater migration is under control.

Sincerely,

A handwritten signature in black ink, appearing to read "Steven D. Smith", is written over a horizontal line.

Steven D. Smith

cc: Nabil Fayoumi EPA
Sandra Bron Illinois EPA
Jim Moore Illinois EPA
Gina Search Illinois EPA
Bruce Yare Solutia
Richard Williams Williams & Associates
Bob Hiller Solutia

CA750 Groundwater Migration
Under Control
Addendum

W.G. Krummrich Plant
Sauget, Illinois

April 19, 2004

Prepared for:
USEPA Region 5 RCRA
Chicago, Illinois

Submitted by:
Solutia Inc.
St. Louis, Missouri

Section 1 - Water Level and Pumping Rate Data

- **Extraction Well, Water-Level Piezometer and Existing Monitoring Well Location Map**
- **Extraction Well Pumping Rate Protocol Chronology**
- **Surface Water Level, Groundwater Level (PZ-1S, PZ-2E, PZ-3E and PZ-4E) and Extraction Well Pumping Rate Data Tables and Plots**
 - October 22 to 31, 2003
 - November 2003
 - December 2003
 - January 2004
 - February 2004
 - March 2004
 - April 1 to 11, 2004
- **Surface Water Level and Groundwater Level Data Table**
 - Extraction Wells EW-1, 2 and 3
 - Water-Level Piezometers PZ-1 N/S, PZ-2 E/W, PZ-3 E/W and PZ-4 E/W
 - Existing Monitoring Wells B-21B, B-25B, B-26B, B-27B, B-28B and B-29B
 - Existing Monitoring Well GM-27B
- **Well Logs and Construction Records**
 - Screen Elevation Summary
 - Extraction Wells EW-1, 2 and 3
 - Water-Level Piezometers PW-1N/S, PW-2E/W, PW-3E/W and PW-4E/W
 - Existing Monitoring Well GM-27B
- **Geologic Sections**
 - July 2003 URS Barrier Wall Alignment Profile
 - January 1984 D'Appolonia Bedrock Investigation

Section 2 - Hydraulic Control of Groundwater Migration

- **October 22, 2003 to January 31, 2004 (Water Level vs. Time Plots)**
 - **Line of Evidence 1** - Surface Water Level > Groundwater Levels (Gradient Reversal, No Groundwater Discharge to Surface Water)
 - **Line of Evidence 2** - Surface Water Level > Pumping Water Levels (Gradient from River to Pumping Wells)
 - **Line of Evidence 3** - Groundwater Levels > Pumping Water Levels (Gradient from Water-Level Piezometers to Pumping Wells)
- **February 1, 2004 to April 11, 2004 (Groundwater Contour Maps)**

- **Line of Evidence 4** - Surface Water Level > Groundwater Levels (Gradient Reversal, No Groundwater Discharge to Surface Water)
- **Line of Evidence 5** - Groundwater Levels > Pumping Water Levels (Hydraulic Trough Along River)

Section 3 - Physical Control of Groundwater Migration (Water Level vs Time Plots)

- **Line of Evidence 6** - Surface Water Level > Outside GWL (PZ-2W) > Inside GWL (PZ-2E) > PWL (Gradient from River to Pumping Wells)
- **Line of Evidence 7** - Outside GWL (PZ-2W) > Inside GWL (PZ-2E) (Gradient Across Slurry Trench/Barrier Wall)
- **Line of Evidence 8** - Surface Water Level > Outside GWL (PZ-3W) > Inside GWL (PZ-3E) > PWL (Gradient from River to Pumping Wells)
- **Line of Evidence 9** - Outside GWL (PZ-3W) > Inside GWL (PZ-3E) (Gradient Across Slurry Trench/Barrier Wall)

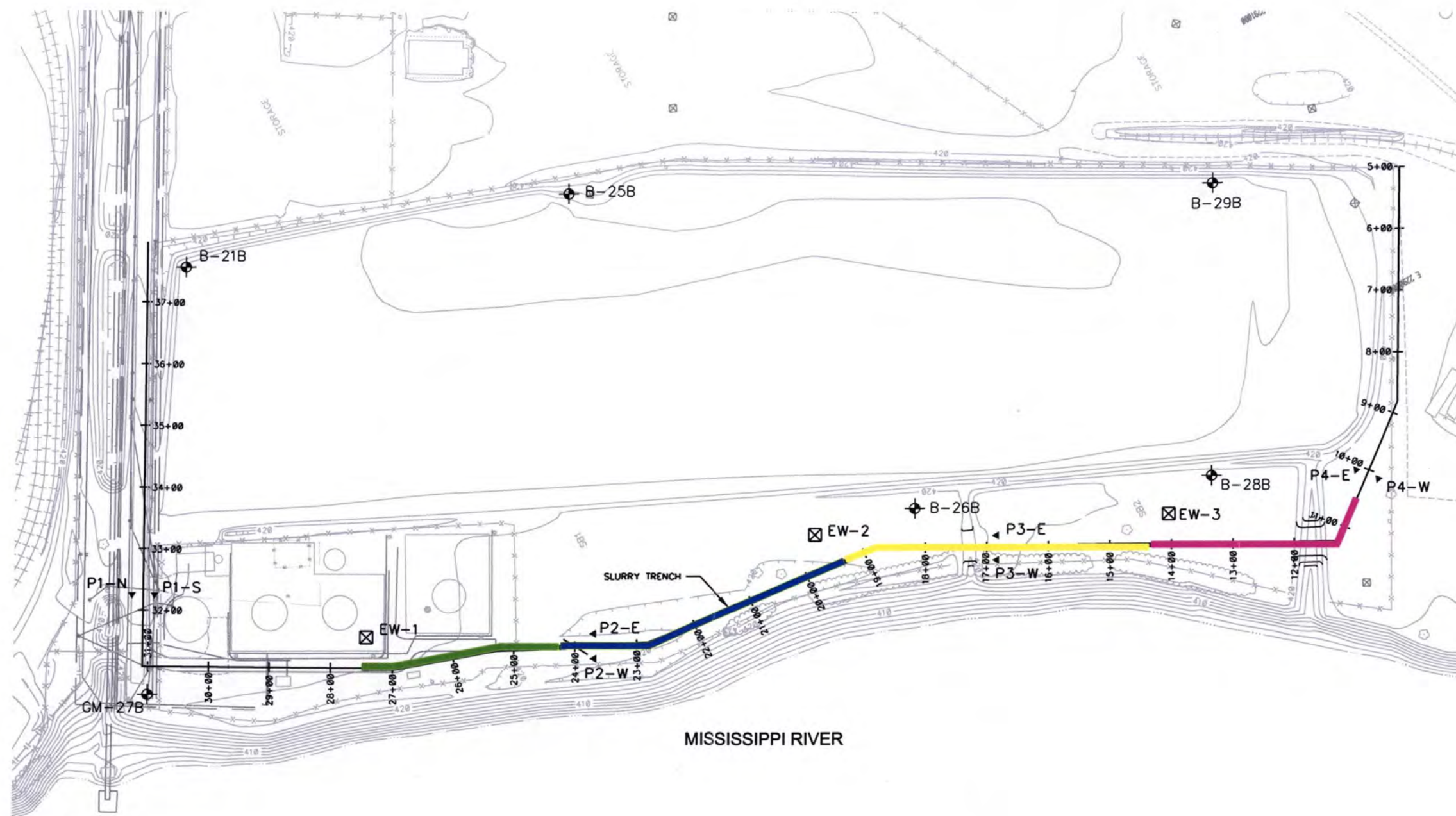
Section 4 - Groundwater Control Data Gap Analysis

Section 5 - Plume Stability Monitoring Plan

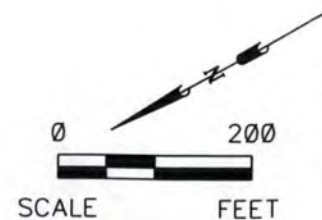
- **Monitoring Plan**
 - **Plume Volume Monitoring**
 - **Groundwater Quality Monitoring**
 - **Unstable Plume Criteria**
- **Well Location Map**

Notes

**EXTRACTION WELL,
WATER-LEVEL PIEZOMETER
AND
EXISTING MONITORING WELL LOCATION MAP**



- LEGEND**
- **SEPTEMBER**
 - **OCTOBER**
 - **NOVEMBER**
 - **DECEMBER**



SOLUTIATM
Applied Chemistry, Creative Solutions

SOLUTIA INC.
575 MARYVILLE CENTRE DRIVE
ST. LOUIS, MO. 63141

GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS		PROJECT NO.
Site Layout		FIG. NO. 1

**EXTRACTION WELL
PUMPING RATE PROTOCOL
CHRONOLOGY**

EXTRACTION WELL PUMPING RATE PROTOCOL CHRONOLOGY

<u>Year</u>	<u>From</u>	<u>To</u>	<u>Pumping Rate Protocol</u>
2003	July 12	September 28	Total extraction system flow restricted to 200 gpm by American Bottoms Regional Treatment Facility (ABRTF)
	September 29	October 21	Total extraction system flow restricted between 500 gpm and 1200 gpm
	October 22	November 24	ABRTF lifted flow restrictions; allowed discharge at up to maximum rate. Total extraction well system determined using Record of Decision (ROD) pumping rate look-up table for Alternative C - Hydraulic Barrier (No Wall). Flow from each extraction limited to a maximum of 600 gpm.
	November 25	December 8	Extraction well flow based on average groundwater level in two closest piezometers; pumping rate adjusted to keep average groundwater level within +/- 0.5 ft. of surface water level. Pumping rate adjustments were made on an hourly basis in increments of 10% of the look-up table. 600 gpm maximum extraction well flow rate restriction removed on December 7.
	December 9	December 14	Extraction well flow based on average groundwater level in two closest piezometers; pumping rate adjusted to keep average groundwater level within +/- 0.5 ft. of surface water level. Pumping rate adjustments made every four hours. Look-up table no longer used to control pumping rates.
	December 15	December 31	Extraction system total flow rate adjusted to keep groundwater level in each piezometer within +/- 0.5 ft. of surface water level. Pumping rate adjustments made every two hours. New algorithm used to control pumping rate changes.
2004	January 1	January 21	Extraction system total flow rate adjusted to keep groundwater level in each piezometer within +/- 0.5 ft. of surface water level. Pumping rate adjustments made every two hours. New algorithm used to control pumping rate changes.
	January 22	January 29	Extraction system total flow rate adjusted to keep groundwater level in each piezometer within 0 to - 1 ft. of surface water level. Pumping

EXTRACTION WELL PUMPING RATE PROTOCOL CHRONOLOGY

<u>Year</u>	<u>From</u>	<u>To</u>	<u>Pumping Rate Protocol</u>
			rate adjustments made every hour. New algorithm used to control pumping rate changes so that groundwater levels would track surface water levels more closely.
2004	January 29		Extraction well EW-2 pump failure.
	February 2		System temporarily shut down to replace EW-2.
			Water-level transducer in EW-2 set at incorrect depth after pump replacement.
	February 3		Extraction system operation resumed.
	February 4	February 17	Extraction system operated at maximum pumping capacity (2225 gpm).
	February 18	March 4	Extraction system operated at maximum pumping capacity (2175 gpm). EW-3 flow reduced by 50 gpm to prevent electrical overload and automatic pump shut down.
	March 5	March 15	ABRTF restricted total extraction system flow to 500 gpm because of treatment system upset that resulted in a TSS excursion.
	March 16		EW - 2 water-level transducer set at correct elevation.
	March 16	April 11	Extraction system total flow determined using Record of Decision (ROD) pumping rate look-up table for Alternative C - Hydraulic Barrier (No Wall).

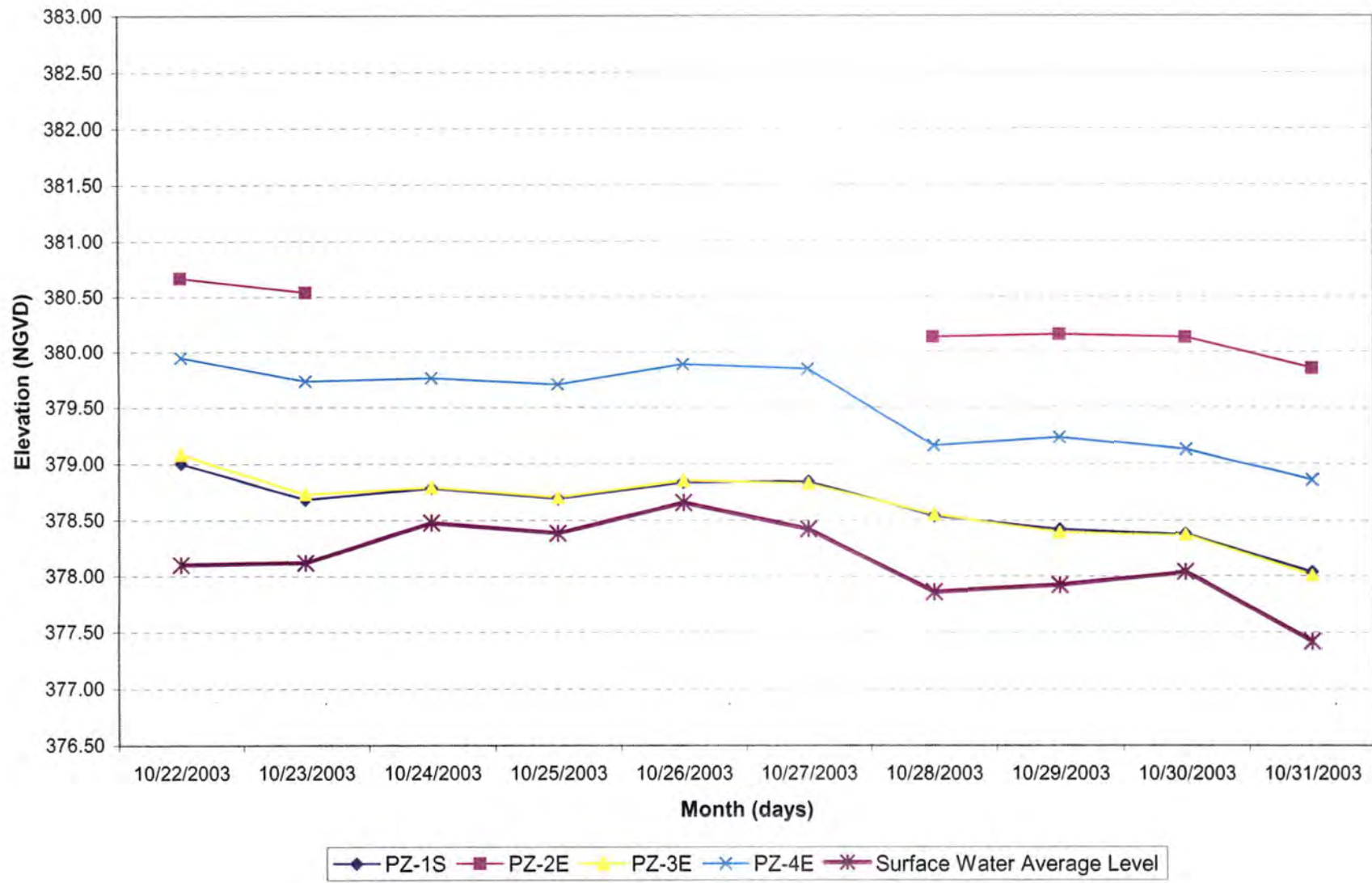
**WATER LEVEL AND PUMPING RATE
DATA TABLES AND PLOTS
OCTOBER 22 to 31, 2003**

October Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow	River Stage Average Level	Average Daily Water Level Readings			
	GPM avg over 24 hrs	River Stage avg	PZ-1S 24-hr average	PZ-2E 24-hr average	PZ-3E 24-hr average	PZ-4E 24-hr average
10/22/2003	1492.00	378.10	379.00	380.66	379.08	379.95
10/23/2003	1744.63	378.12	378.68	380.53	378.73	379.73
10/24/2003	1727.51	378.48	378.78		378.79	379.76
10/25/2003	1674.23	378.38	378.69		378.70	379.70
10/26/2003	1717.45	378.65	378.83		378.85	379.88
10/27/2003	1727.42	378.42	378.84		378.82	379.84
10/28/2003	1755.44	377.86	378.54	380.13	378.55	379.16
10/29/2003	1755.02	377.92	378.42	380.15	378.40	379.23
10/30/2003	1745.46	378.03	378.37	380.13	378.37	379.12
10/31/2003	1778.60	377.42	378.03	379.85	378.00	378.86

GPM Gallons per Minute
 avg Average
 WL Water Level
 (blank cell) System down

**October Daily Average Water Level Readings
Sauget Area 2 Groundwater Migration Control System**



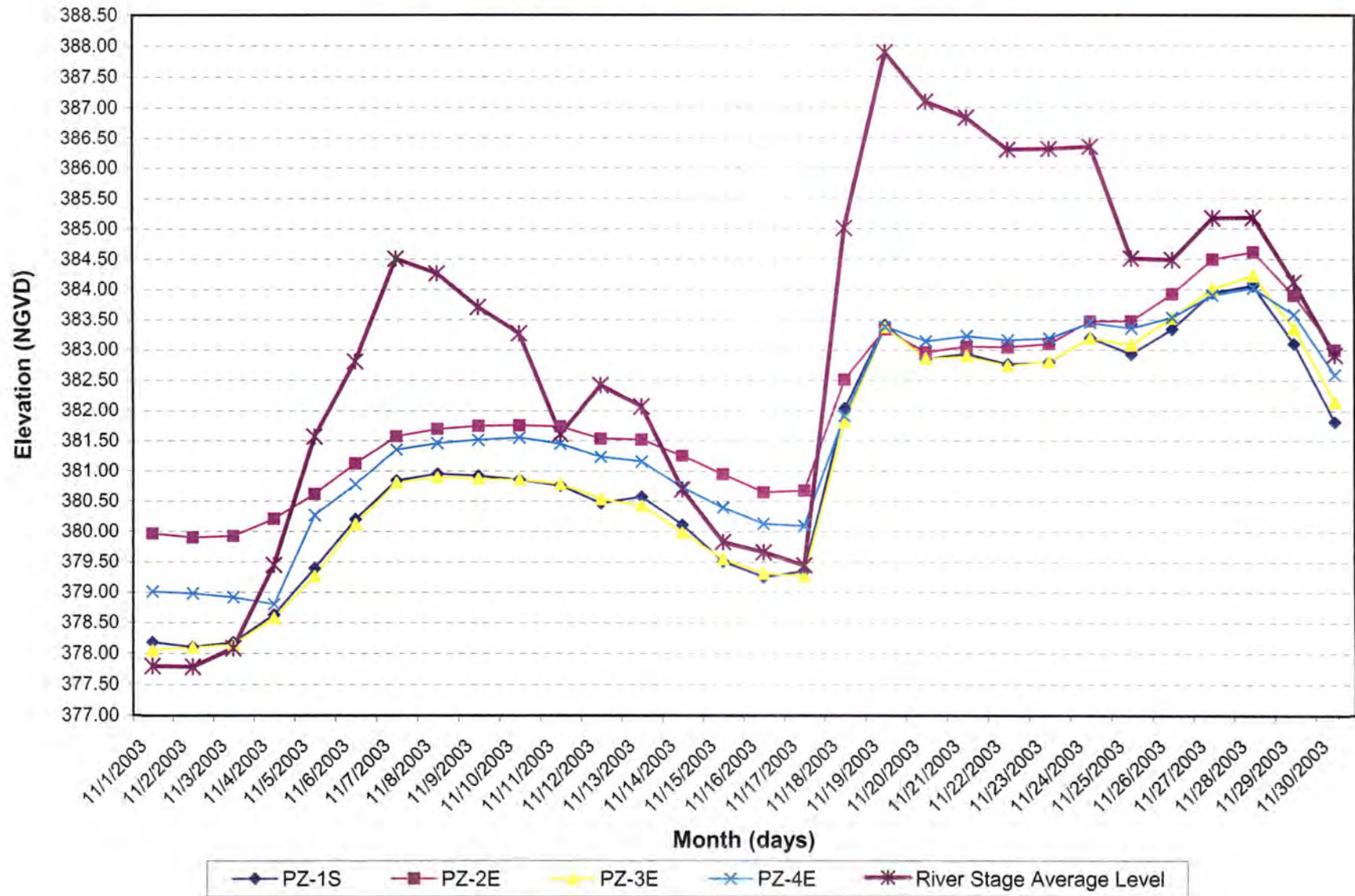
**WATER LEVEL AND PUMPING RATE
DATA TABLES AND PLOTS
NOVEMBER 2003**

November Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow GPM avg over 24 hrs	River Stage Average Level Daily WL avg	Average Daily Water Level Readings			
			PZ-1S	PZ-2E	PZ-3E	PZ-4E
			24-hr average	24-hr average	24-hr average	24-hr average
11/1/2003	1760.03	377.79	378.18	379.96	378.05	379.01
11/2/2003	1762.07	377.78	378.10	379.90	378.10	378.98
11/3/2003	1747.35	378.08	378.17	379.92	378.14	378.91
11/4/2003	1682.49	379.44	378.63	380.20	378.58	378.80
11/5/2003	1577.33	381.56	379.39	380.61	379.26	380.27
11/6/2003	1503.71	382.80	380.20	381.12	380.12	380.78
11/7/2003	1425.80	384.50	380.84	381.57	380.80	381.35
11/8/2003	1437.13	384.25	380.95	381.69	380.89	381.46
11/9/2003	1462.70	383.70	380.92	381.74	380.87	381.51
11/10/2003	1487.38	383.26	380.85	381.75	380.85	381.55
11/11/2003	1388.55	381.60	380.76	381.73	380.78	381.45
11/12/2003	1530.31	382.41	380.46	381.53	380.53	381.23
11/13/2003	1543.08	382.06	380.57	381.51	380.42	381.15
11/14/2003	1615.00	380.69	380.11	381.25	379.98	380.73
11/15/2003	1658.33	379.83	379.51	380.95	379.55	380.40
11/16/2003	1667.19	379.65	379.25	380.64	379.31	380.13
11/17/2003	1679.32	379.44	379.35	380.67	379.27	380.10
11/18/2003	641.30	385.00	382.03	382.50	381.81	381.91
11/19/2003	1086.62	387.88	383.40	383.33	383.37	383.38
11/20/2003	1294.62	387.08	382.85	382.95	382.85	383.14
11/21/2003	1307.92	386.83	382.93	383.05	382.89	383.23
11/22/2003	1334.53	386.29	382.75	383.04	382.74	383.16
11/23/2003	1336.20	386.30	382.79	383.09	382.80	383.19
11/24/2003	1052.11	386.34	383.20	383.47	383.19	383.45
11/25/2003	881.96	384.50	382.93	383.47	383.08	383.35
11/26/2003	458.99	384.48	383.34	383.92	383.52	383.54
11/27/2003	224.93	385.16	383.94	384.49	384.00	383.90
11/28/2003	250.08	385.17	384.06	384.60	384.22	384.02
11/29/2003	882.72	384.11	383.10	383.90	383.34	383.59
11/30/2003	1402.83	382.91	381.82	383.00	382.14	382.59

GPM Gallons per Minute
avg Average
WL Water Level

November Average Daily Water Level Readings Sauget Area 2 Groundwater Migration Control System



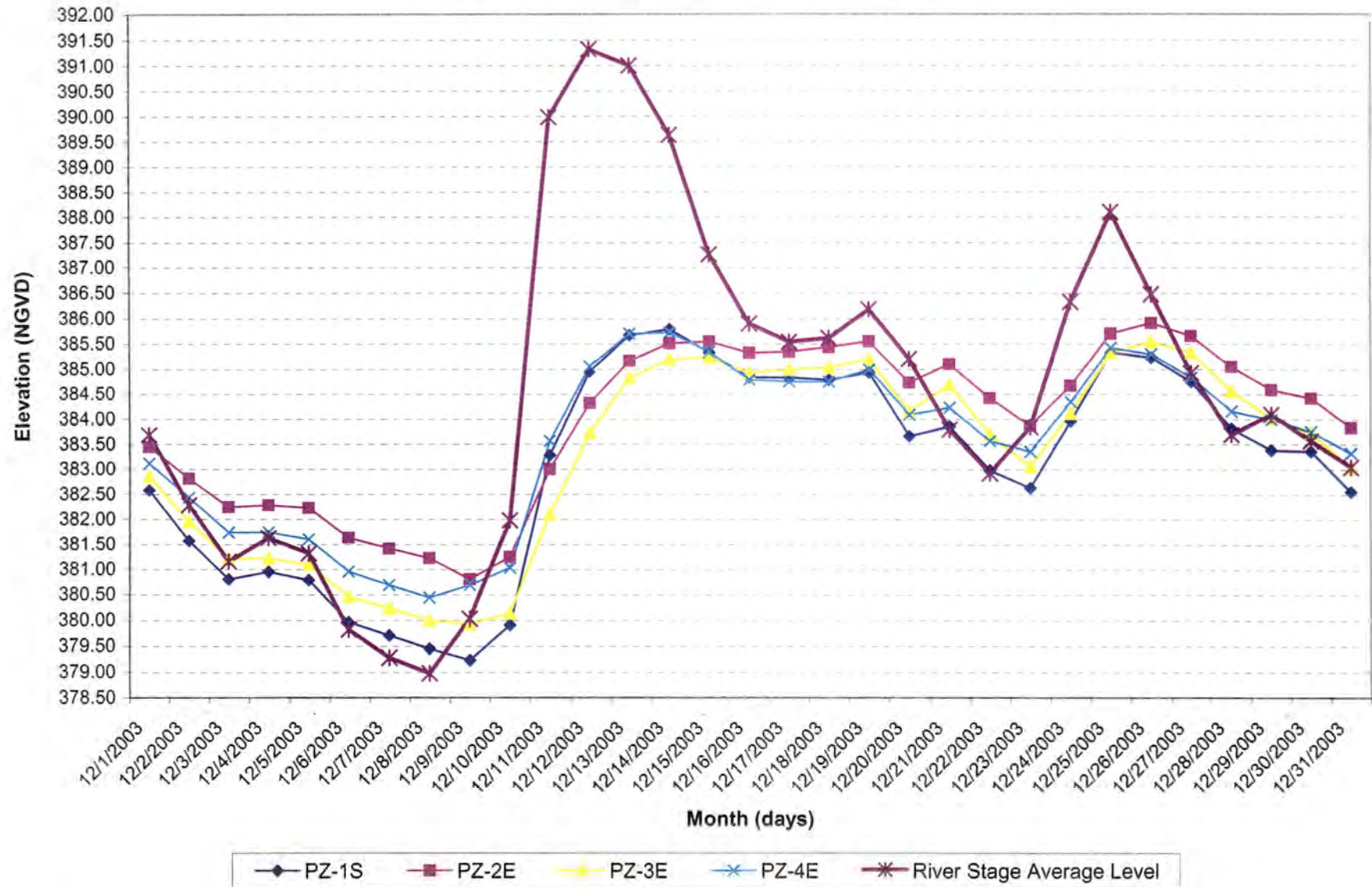
**WATER LEVEL AND PUMPING RATE
DATA TABLES AND PLOTS
DECEMBER 2003**

December Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow	River Stage Average Level	Average Daily Water Level Readings			
	GPM avg over 24 hrs	Daily WL avg	PZ-1S	PZ-2E	PZ-3E	PZ-4E
			24-hr average	24-hr average	24-hr average	24-hr average
12/1/2003	830.12	383.68	382.58	383.43	382.84	383.12
12/2/2003	1494.90	382.28	381.57	382.81	381.94	382.43
12/3/2003	1697.26	381.15	380.80	382.24	381.20	381.74
12/4/2003	1570.40	381.62	380.95	382.28	381.21	381.75
12/5/2003	1579.00	381.32	380.79	382.23	381.08	381.61
12/6/2003	1776.35	379.82	379.97	381.63	380.45	380.96
12/7/2003	1800.09	379.28	379.71	381.41	380.23	380.69
12/8/2003	1902.55	378.98	379.45	381.22	379.99	380.45
12/9/2003	2141.14	380.03	379.23	380.80	379.92	380.70
12/10/2003	1812.99	381.98	379.91	381.25	380.13	381.03
12/11/2003	1231.90	389.98	383.28	383.00	382.08	383.57
12/12/2003	748.40	391.32	384.95	384.32	383.71	385.06
12/13/2003	375.08	390.99	385.67	385.16	384.81	385.70
12/14/2003	229.15	389.62	385.79	385.51	385.18	385.73
12/15/2003	224.93	387.26	385.33	385.54	385.22	385.35
12/16/2003	225.37	385.90	384.84	385.32	384.92	384.79
12/17/2003	224.96	385.54	384.83	385.34	384.98	384.76
12/18/2003	225.28	385.61	384.79	385.43	385.02	384.75
12/19/2003	224.92	386.18	384.93	385.55	385.19	385.00
12/20/2003	235.95	385.20	383.66	384.73	384.15	384.10
12/21/2003	460.81	383.78	383.85	385.10	384.67	384.23
12/22/2003	847.52	382.92	382.98	384.42	383.69	383.57
12/23/2003	1111.96	383.84	382.63	383.86	383.04	383.36
12/24/2003	717.45	386.33	383.96	384.67	384.10	384.35
12/25/2003	330.48	388.09	385.33	385.70	385.32	385.43
12/26/2003	224.85	386.47	385.24	385.91	385.53	385.30
12/27/2003	273.80	384.93	384.75	385.65	385.32	384.84
12/28/2003	575.63	383.69	383.82	385.05	384.55	384.17
12/29/2003	836.97	384.09	383.38	384.59	384.00	384.00
12/30/2003	842.94	383.56	383.36	384.41	383.72	383.76
12/31/2003	1189.19	383.04	382.56	383.83	383.02	383.33

GPM Gallons per Minute
 avg Average
 WL Water Level

December Average Daily Water Level Readings Sauget Area 2 Groundwater Migration Control System



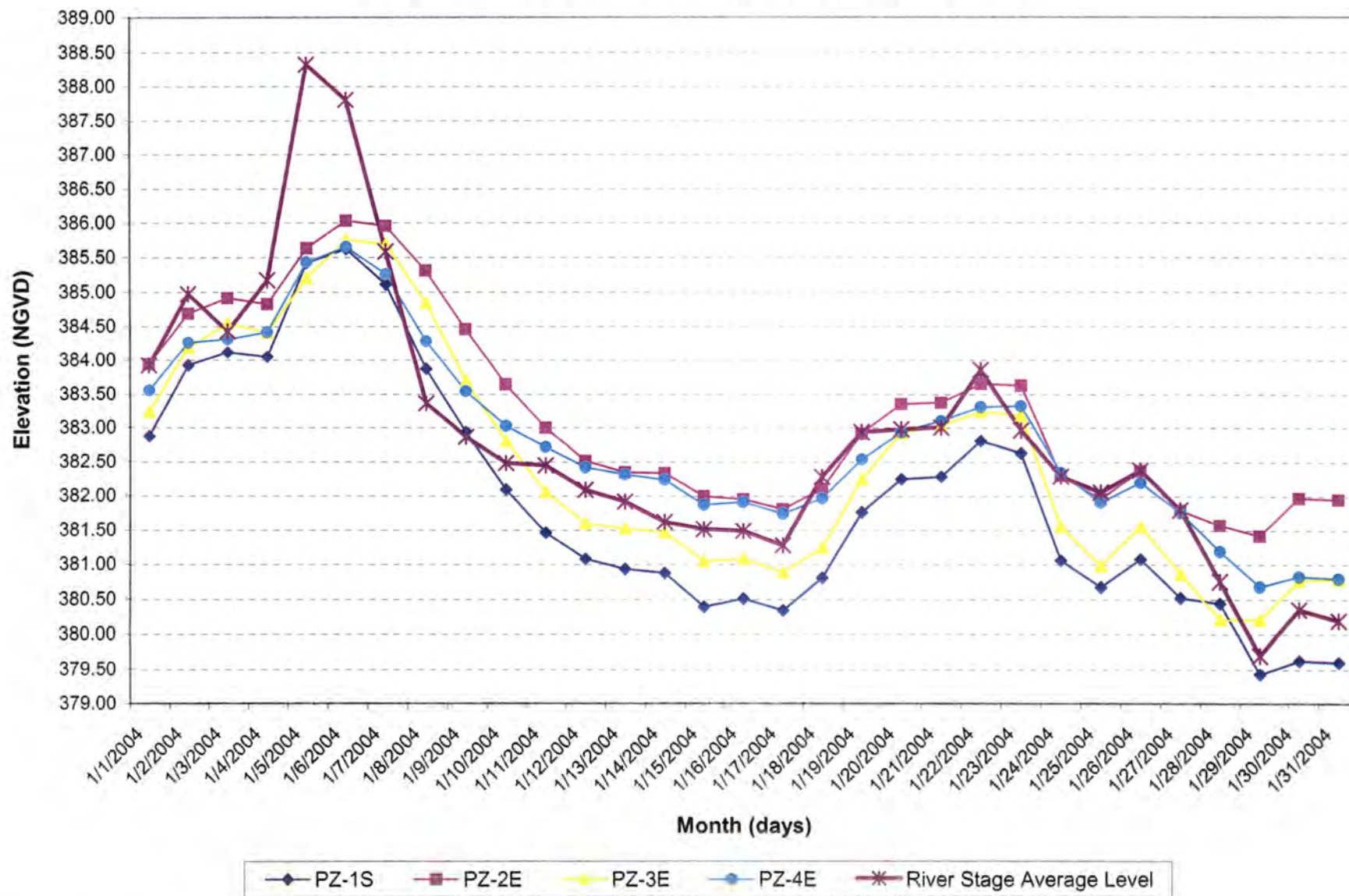
**WATER LEVEL AND PUMPING RATE
DATA TABLES AND PLOTS
JANUARY 2004**

January Water Level Data **Sauget Area 2 Groundwater Migration Control System**

Date	Total Combined Flow GPM avg over 24 hrs	River Stage Average Level Daily WL avg	Average Daily Water Level Readings			
			PZ-1S 24-hr average	PZ-2E 24-hr average	PZ-3E 24-hr average	PZ-4E 24-hr average
1/1/2004	1096.83	383.92	382.88	383.94	383.23	383.56
1/2/2004	652.70	384.97	383.93	384.68	384.18	384.27
1/3/2004	487.48	384.43	384.12	384.91	384.53	384.31
1/4/2004	613.59	385.17	384.05	384.82	384.40	384.42
1/5/2004	384.96	388.32	385.42	385.63	385.19	385.43
1/6/2004	259.69	387.80	385.62	386.03	385.74	385.65
1/7/2004	245.50	385.58	385.11	385.95	385.68	385.26
1/8/2004	497.78	383.36	383.87	385.30	384.83	384.28
1/9/2004	918.29	382.86	382.93	384.45	383.69	383.55
1/10/2004	1385.42	382.48	382.09	383.64	382.79	383.03
1/11/2004	1779.93	382.45	381.46	383.00	382.05	382.72
1/12/2004	1825.97	382.09	381.08	382.51	381.60	382.42
1/13/2004	1811.48	381.92	380.93	382.35	381.52	382.32
1/14/2004	1827.17	381.62	380.88	382.33	381.46	382.24
1/15/2004	1930.95	381.52	380.40	382.00	381.04	381.88
1/16/2004	1872.59	381.49	380.51	381.95	381.08	381.92
1/17/2004	1927.83	381.28	380.35	381.81	380.88	381.75
1/18/2004	1588.03	382.28	380.81	382.10	381.24	381.97
1/19/2004	1064.58	382.93	381.77	382.91	382.24	382.55
1/20/2004	832.27	382.98	382.25	383.35	382.92	382.94
1/21/2004	904.03	383.00	382.29	383.38	383.03	383.10
1/22/2004	777.38	383.85	382.81	383.65	383.23	383.32
1/23/2004	966.47	382.96	382.63	383.63	383.18	383.33
1/24/2004	1757.30	382.29	381.06	382.30	381.55	382.35
1/25/2004	1952.70	382.06	380.68	381.96	380.98	381.92
1/26/2004	1497.70	382.38	381.08	382.38	381.55	382.20
1/27/2004	1793.29	381.80	380.53	381.79	380.85	381.77
1/28/2004	2016.60	380.75	380.44	381.58	380.21	381.20
1/29/2004	1860.00	379.70	379.43	381.42	380.20	380.68
1/30/2004	1500.01	380.35	379.63	381.97	380.76	380.83
1/31/2004	1500.03	380.19	379.60	381.95	380.78	380.80

GPM Gallons per Minute
 avg Average
 WL Water Level

January Average Daily Water Level Readings Sauget Area 2 Groundwater Migration Control System



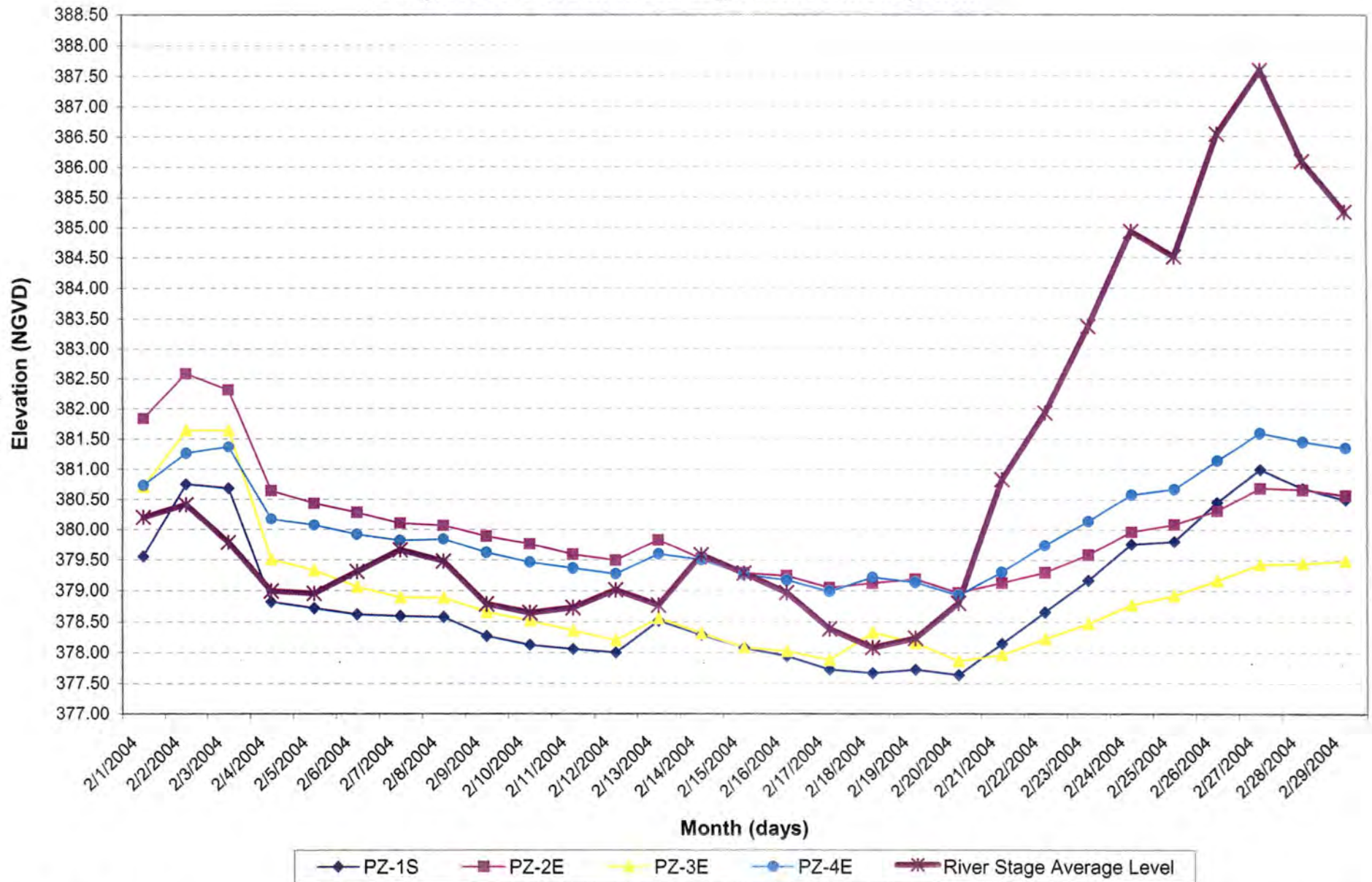
**WATER LEVEL AND PUMPING RATE
DATA TABLES AND PLOTS
FEBRUARY 2004**

February Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow GPM avg over 24 hrs	River Stage Average Level Daily WL avg	Average Daily Water Level Readings			
			PZ-1S 24-hr average	PZ-2E 24-hr average	PZ-3E 24-hr average	PZ-4E 24-hr average
2/1/2004	1500.03	380.20	379.55	381.83	380.70	380.73
2/2/2004	810.83	380.41	380.75	382.58	381.63	381.26
2/3/2004	1028.95	379.78	380.68	382.31	381.63	381.37
2/4/2004	2177.46	378.99	378.81	380.64	379.50	380.17
2/5/2004	2225.00	378.95	378.71	380.43	379.32	380.07
2/6/2004	2225.05	379.30	378.62	380.28	379.05	379.92
2/7/2004	2225.05	379.66	378.59	380.10	378.88	379.82
2/8/2004	2225.01	379.47	378.58	380.06	378.88	379.84
2/9/2004	2225.03	378.78	378.27	379.88	378.65	379.62
2/10/2004	2225.03	378.64	378.13	379.76	378.51	379.46
2/11/2004	2224.99	378.72	378.06	379.58	378.35	379.36
2/12/2004	2225.02	379.00	378.00	379.49	378.19	379.27
2/13/2004	2083.33	378.76	378.52	379.82	378.55	379.60
2/14/2004	2224.99	379.58	378.29	379.51	378.31	379.50
2/15/2004	2225.00	379.28	378.08	379.28	378.08	379.26
2/16/2004	2225.01	378.96	377.94	379.24	378.02	379.17
2/17/2004	2224.98	378.39	377.73	379.05	377.88	378.99
2/18/2004	2070.29	378.08	377.67	379.12	378.32	379.22
2/19/2004	2174.98	378.24	377.73	379.18	378.15	379.14
2/20/2004	2175.05	378.80	377.63	378.96	377.85	378.93
2/21/2004	2175.03	380.83	378.15	379.12	377.96	379.30
2/22/2004	2175.03	381.93	378.65	379.29	378.22	379.74
2/23/2004	2175.03	383.36	379.16	379.58	378.46	380.14
2/24/2004	2175.03	384.93	379.76	379.96	378.76	380.58
2/25/2004	2175.03	384.50	379.80	380.08	378.91	380.67
2/26/2004	2175.05	386.53	380.45	380.31	379.15	381.14
2/27/2004	2175.02	387.58	381.00	380.68	379.42	381.60
2/28/2004	2174.99	386.08	380.68	380.66	379.43	381.45
2/29/2004	2175.00	385.25	380.50	380.57	379.48	381.35

GPM Gallons per Minute
 avg Average
 WL Water Level

February Average Daily Water Level Readings Sauget Area 2 Groundwater Migration Control System



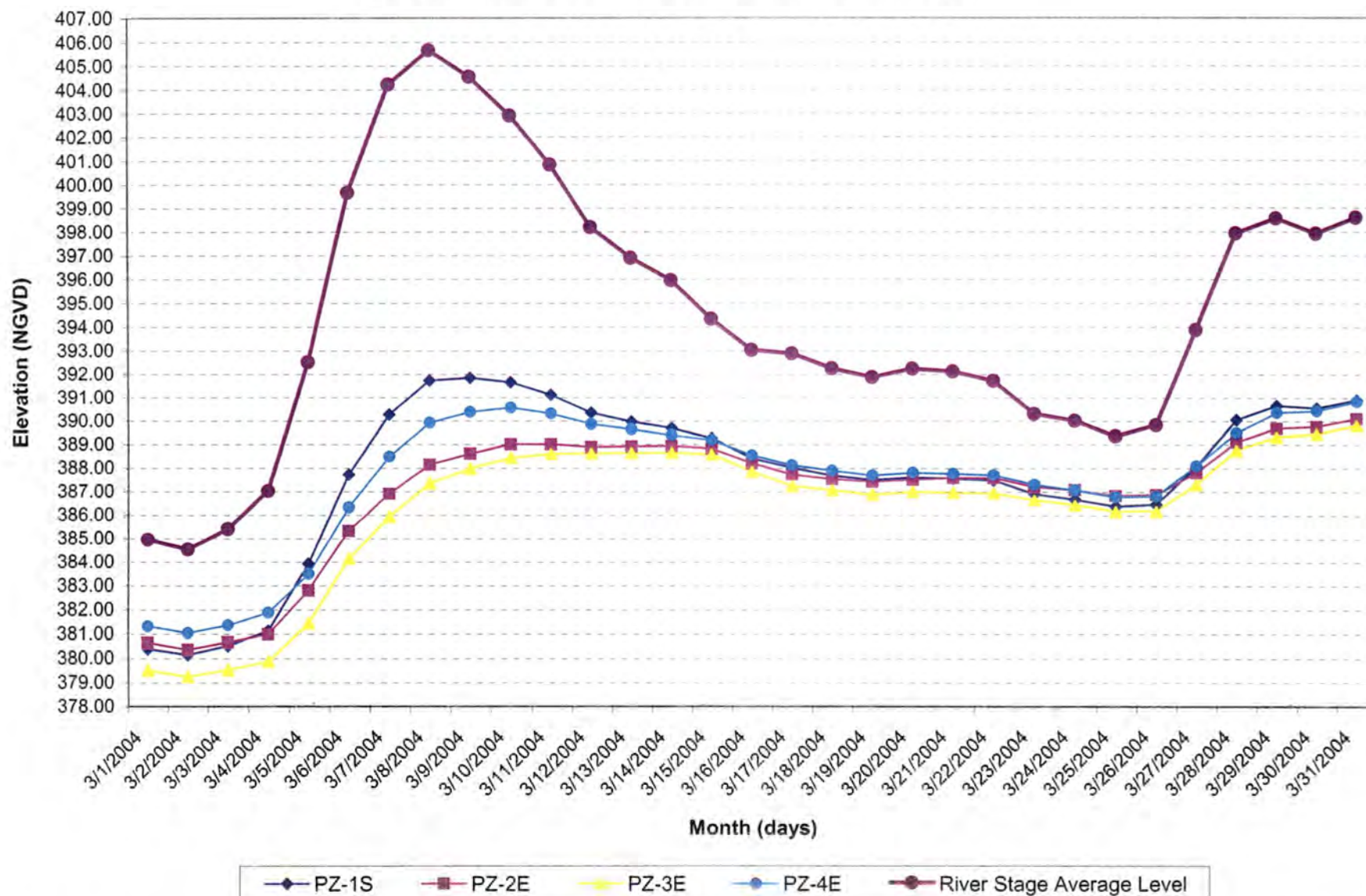
**WATER LEVEL AND PUMPING RATE
DATA TABLES AND PLOTS
MARCH 2004**

March Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow GPM avg over 24 hrs	River Stage Average Level Daily WL avg	Average Daily Water Level Readings			
			PZ-1S 24-hr average	PZ-2E 24-hr average	PZ-3E 24-hr average	PZ-4E 24-hr average
3/1/2004	2175.03	384.94	380.40	380.63	379.49	381.33
3/2/2004	2175.01	384.52	380.15	380.35	379.23	381.04
3/3/2004	2174.93	385.40	380.52	380.66	379.51	381.37
3/4/2004	2175.05	387.01	381.13	380.98	379.86	381.89
3/5/2004	1180.12	392.50	383.92	382.79	381.42	383.49
3/6/2004	449.99	399.64	387.72	385.31	384.12	386.33
3/7/2004	449.74	404.19	390.26	386.89	385.90	388.50
3/8/2004	435.44	405.64	391.73	388.14	387.33	389.93
3/9/2004	419.20	404.52	391.84	388.60	387.95	390.38
3/10/2004	449.93	402.88	391.65	389.00	388.41	390.57
3/11/2004	449.93	400.82	391.12	389.00	388.58	390.32
3/12/2004	449.85	398.18	390.35	388.88	388.60	389.87
3/13/2004	449.73	396.89	389.98	388.91	388.63	389.65
3/14/2004	449.75	395.94	389.70	388.93	388.64	389.40
3/15/2004	449.88	394.33	389.28	388.82	388.56	389.20
3/16/2004	764.33	393.03	388.43	388.20	387.83	388.55
3/17/2004	1007.17	392.88	388.02	387.73	387.23	388.14
3/18/2004	1036.44	392.25	387.70	387.53	387.04	387.91
3/19/2004	1058.11	391.88	387.49	387.42	386.85	387.71
3/20/2004	1039.30	392.23	387.61	387.51	386.98	387.82
3/21/2004	1044.42	392.12	387.56	387.58	386.93	387.78
3/22/2004	1062.90	391.72	387.48	387.58	386.91	387.72
3/23/2004	1131.91	390.31	386.90	387.20	386.63	387.30
3/24/2004	1148.66	390.02	386.66	387.08	386.41	387.07
3/25/2004	1181.36	389.36	386.37	386.83	386.14	386.78
3/26/2004	1163.03	389.83	386.45	386.86	386.15	386.81
3/27/2004	969.81	393.88	388.06	387.80	387.28	388.10
3/28/2004	758.08	397.92	390.06	389.10	388.74	389.51
3/29/2004	722.68	398.55	390.66	389.68	389.30	390.37
3/30/2004	754.41	397.91	390.56	389.76	389.44	390.45
3/31/2004	724.26	398.58	390.91	390.10	389.80	390.85

GPM Gallons per Minute
 avg Average
 WL Water Level

March Average Daily Water Level Readings Sauget Area 2 Groundwater Migration Control System



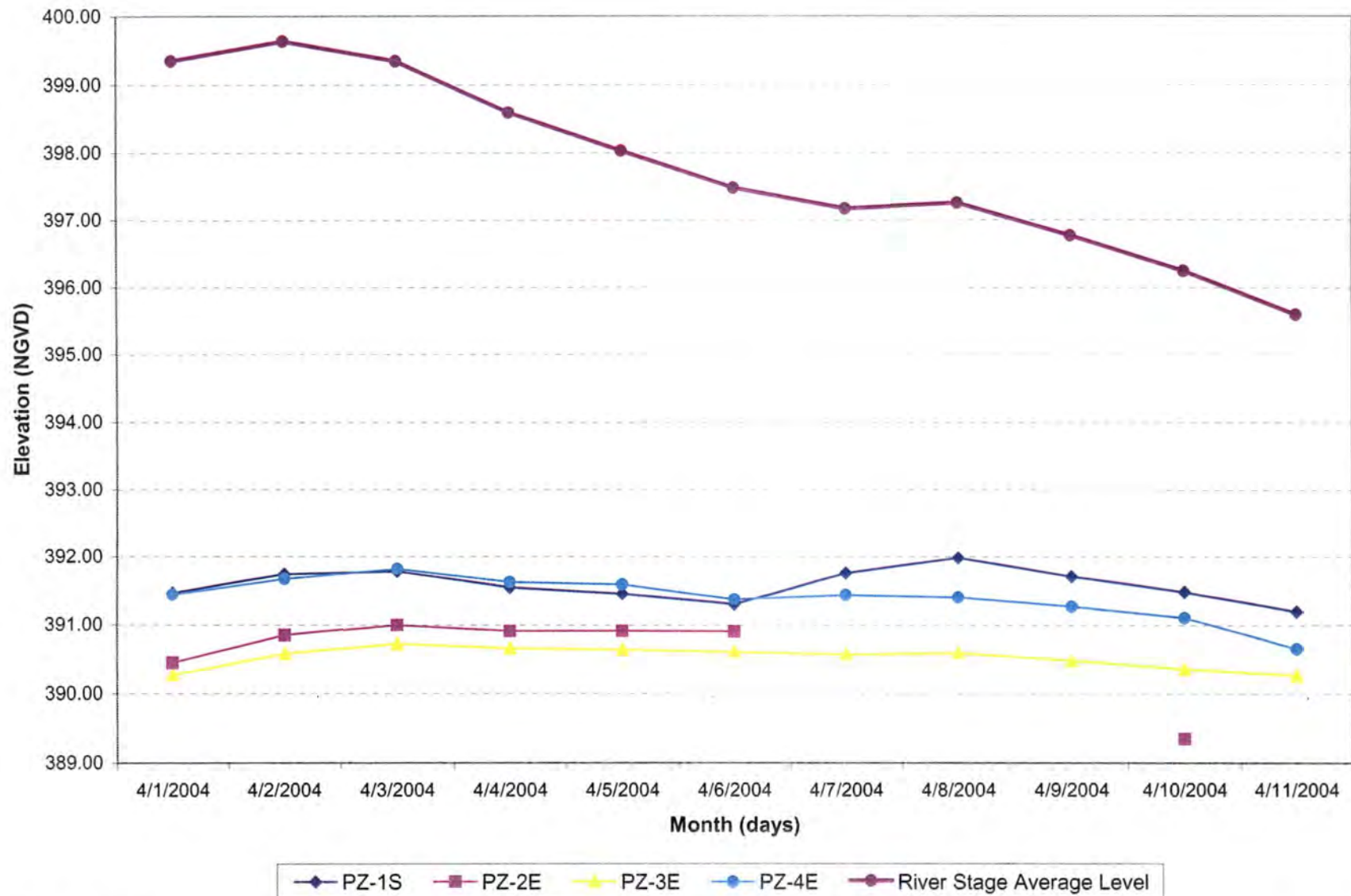
**WATER LEVEL AND PUMPING RATE
DATA TABLES AND PLOTS
APRIL 1 to 11, 2004**

April Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow GPM avg over 24 hrs	River Stage Average Level Daily WL avg	Average Daily Water Level Readings			
			PZ-1S	PZ-2E	PZ-3E	PZ-4E
			24-hr average	24-hr average	24-hr average	24-hr average
4/1/2004	683.75	399.34	391.47	390.45	390.27	391.45
4/2/2004	669.54	399.63	391.74	390.84	390.57	391.67
4/3/2004	682.79	399.34	391.78	390.99	390.72	391.82
4/4/2004	719.57	398.58	391.55	390.91	390.66	391.63
4/5/2004	747.69	398.02	391.46	390.91	390.64	391.59
4/6/2004	775.74	397.47	391.30	390.90	390.60	391.38
4/7/2004	792.46	397.16	391.76		390.57	391.44
4/8/2004	788.02	397.24	391.98		390.59	391.41
4/9/2004	811.06	396.76	391.71		390.47	391.28
4/10/2004	837.97	396.24	391.48	389.34	390.35	391.11
4/11/2004	868.68	395.60	391.20		390.26	390.66

GPM Gallons per Minute
 avg Average
 WL Water Level
 (blank cell) System down.

April Average Daily Water Level Readings Sauget Area 2 Groundwater Migration Control System



WATER LEVEL DATA

EXTRACTION WELLS EW-1, 2 and 3

PIEZOMETERS PZ-1 N/S, PZ-2 E/W, PZ-3 E/W and PZ-4 E/W

EXISTING MONITORING WELLS B-21B, 25B, 26B, 27B, 28B and 29B

EXISTING MONITORING WELL GM-27B

FEBRUARY To APRIL 2004

Average Daily water Level Readings
[Piezometers, Monitoring Wells, Extraction Well, and Surface Water]
Sauget Area 2 Groundwater Migration Control System

Date	PZ-1S	PZ-2E	PZ-3E	PZ-4E	PZ-1N	PZ-2W	PZ-3W	PZ-4W	B-21B	B-25B	B-26B	B-29B	B-28B	GM-27B	EW1	EW2	EW3	RS
12-Feb-04	378.00	379.49	378.19	379.27	378.33	377.68	378.66	380.08	382.87	382.95	379.32	382.76	379.08	na	364.75	370.28	369.67	379.00
16-Feb-04	377.94	379.24	378.02	379.17	378.26	377.70	378.68	380.01	382.67	382.75	379.12	382.66	378.98	na	365.02	375.08	369.70	378.96
17-Feb-04	377.73	379.05	377.88	378.99	378.05	377.35	378.38	379.81	382.77	382.65	379.12	382.56	378.78	na	364.75	374.84	369.59	378.39
19-Feb-04	377.73	379.18	378.15	379.14	378.06	377.33	378.46	379.95	382.67	382.75	379.22	382.76	379.28	na	365.08	374.86	369.51	378.24
20-Feb-04	377.63	378.96	377.85	378.93	377.90	377.31	378.38	379.78	382.67	382.55	379.12	382.66	379.18	na	364.86	374.48	368.75	378.80
23-Feb-04	379.16	379.58	378.46	380.14	379.18	379.93	380.68	380.66	382.87	382.55	379.22	382.66	379.58	382.04	366.23	374.76	370.18	383.36
24-Feb-04	379.76	379.96	378.76	380.58	379.53	380.75	381.09	380.50	382.97	382.65	379.32	382.66	379.68	382.84	366.83	374.91	370.74	384.93
25-Feb-04	379.80	380.08	378.91	380.67	379.58	380.62	380.93	380.58	383.37	382.85	379.52	383.06	379.98	382.44	366.85	375.09	370.91	384.50
26-Feb-04	380.45	380.31	379.15	381.14	380.18	381.93	382.16	381.13	383.47	382.85	379.62	383.16	380.28	383.54	367.47	375.27	371.15	386.53
1-Mar-04	380.40	380.63	379.49	381.33	380.15	381.07	381.30	381.15	na	383.31	380.13	na	380.67	383.63	367.29	375.53	370.38	384.94
2-Mar-04	380.15	380.35	379.23	381.04	379.90	380.70	380.93	380.91	na	383.24	379.97	na	380.49	383.39	367.00	375.27	371.05	384.52
3-Mar-04	380.52	380.66	379.51	381.37	380.26	381.34	381.50	381.31	na	383.44	380.24	na	380.81	383.91	367.30	375.57	371.30	385.40
4-Mar-04	381.13	380.98	379.86	381.89	380.83	382.47	382.56	381.86	na	383.62	380.53	na	381.17	384.78	367.91	375.86	370.82	387.01
5-Mar-04	383.92	382.79	381.42	383.49	383.55	386.85	386.30	383.57	384.47	383.78	381.62	383.96	382.60	387.90	377.84	375.81	376.51	392.50
6-Mar-04	387.72	385.31	384.12	386.33	387.16	392.81	392.02	386.51	na	384.63	384.10	na	385.43	392.41	386.20	389.95	382.65	399.64
7-Mar-04	390.26	386.89	385.90	388.50	389.51	396.57	395.82	388.64	na	385.59	385.86	na	387.38	395.46	388.55	391.54	384.78	404.19
8-Mar-04	391.73	388.14	387.33	389.93	390.93	398.06	397.39	390.07	388.27	386.32	386.94	383.96	388.53	396.79	389.96	393.02	386.24	405.64
9-Mar-04	391.84	388.60	387.95	390.38	391.05	397.46	396.78	390.35	na	387.53	388.15	na	390.02	396.33	389.98	394.17	387.46	402.88
10-Mar-04	391.65	389.00	388.41	390.57	390.92	396.45	395.77	390.47	na	388.19	388.75	na	390.10	395.44	389.49	394.35	387.53	400.82
11-Mar-04	391.12	389.00	388.58	390.32	390.43	395.04	394.35	390.16	na	388.66	389.00	na	390.01	394.24	388.84	394.43	387.67	398.18
12-Mar-04	390.35	388.88	388.60	389.87	389.76	393.24	392.53	389.65	na	389.04	389.12	na	390.01	393.63	388.52	394.55	387.60	396.89
13-Mar-04	389.98	388.91	388.63	389.65	389.45	392.34	391.61	389.39	na	389.35	389.27	na	390.01	393.20	388.30	394.60	387.46	395.94
14-Mar-04	389.70	388.93	388.64	389.40	389.18	391.72	390.97	389.24	na	389.56	389.36	na	390.01	393.20	387.85	390.55	387.19	394.33
15-Mar-04	389.28	388.82	388.56	389.20	388.78	390.64	389.95	388.92	390.77	389.83	389.45	389.96	389.97	392.48	387.85	390.55	387.19	394.33
16-Mar-04	388.43	388.20	387.83	388.55	387.98	389.47	388.88	388.27	na	389.82	388.81	na	389.23	391.59	385.12	385.32	384.43	393.03
17-Mar-04	388.02	387.73	387.23	388.14	387.55	389.10	388.48	387.90	na	389.66	388.11	na	388.56	391.25	383.39	383.58	382.66	392.88
18-Mar-04	387.70	387.53	387.04	387.91	387.23	388.63	387.97	387.64	na	389.55	387.91	na	388.32	390.87	382.90	383.16	382.48	392.25
19-Mar-04	387.49	387.42	386.85	387.71	387.03	388.33	387.67	387.44	na	389.50	387.78	na	388.17	390.61	382.54	382.92	382.68	391.88
20-Mar-04	387.61	387.51	386.98	387.82	387.18	388.58	387.84	387.58	na	389.56	387.88	na	388.28	390.80	382.78	383.07	382.60	392.23
21-Mar-04	387.56	387.58	386.93	387.78	387.16	388.48	387.74	387.54	na	389.51	387.81	na	388.21	390.73	382.67	382.99	383.24	392.12
22-Mar-04	387.48	387.58	386.91	387.72	387.06	388.24	387.53	387.48	390.07	389.56	387.88	389.56	388.26	390.59	382.45	382.93	383.04	391.72
23-Mar-04	386.90	387.20	386.63	387.30	386.53	387.22	386.70	387.04	390.07	389.44	387.62	389.46	387.95	389.85	381.47	382.28	381.94	390.31
24-Mar-04	386.66	387.08	386.41	387.07	386.33	386.90	386.40	386.79	389.87	389.29	387.40	389.26	387.71	389.57	381.11	381.97	381.39	390.02
25-Mar-04	386.37	386.83	386.14	386.78	385.96	386.43	385.98	386.49	389.57	389.13	387.16	389.06	387.44	389.16	380.60	381.56	381.11	389.36
26-Mar-04	386.45	386.86	386.15	386.81	386.03	386.69	386.10	386.55	na	389.06	387.14	na	387.43	389.30	380.73	381.63	381.15	389.83
27-Mar-04	388.06	387.80	387.28	388.10	387.62	389.62	388.43	387.93	na	389.39	388.00	na	388.51	391.47	383.54	383.57	383.11	393.88
28-Mar-04	390.06	389.10	388.74	389.51	389.53	392.85	391.31	389.65	na	389.98	389.33	na	390.06	394.03	386.78	386.03	385.45	397.92
29-Mar-04	390.66	389.68	389.30	390.37	390.11	393.53	391.98	390.30	391.27	390.42	389.94	390.46	390.71	394.71	387.56	386.75	386.48	398.55
30-Mar-04	390.56	389.76	389.44	390.45	390.03	393.15	391.67	390.33	391.67	390.68	390.12	390.86	390.82	394.51	387.61	386.72	386.19	397.91
31-Mar-04	390.91	390.10	389.80	390.85	390.35	393.68	392.11	390.69	391.97	390.93	390.42	391.16	391.16	394.95	388.32	387.20	386.66	398.58

Fig

Average Daily Water Level Readings
[Piezometers, Monitoring Wells, Extraction Well, and Surface Water]
Sauget Area 2 Groundwater Migration Control System

Fig	Date	PZ-1S	PZ-2E	PZ-3E	PZ-4E	PZ-1N	PZ-2W	PZ-3W	PZ-4W	B-21B	B-25B	B-26B	B-29B	B-28B	GM-27B	EW1	EW2	EW3	RS
42	1-Apr-04	391.47	390.45	390.27	391.45	390.91	394.34	392.75	391.21	392.27	391.25	390.89	391.46	391.67	395.57	389.04	387.85	387.37	399.34
43	2-Apr-04	391.74	390.84	390.57	391.67	391.15	394.65	392.99	391.48	392.57	391.52	391.19	391.66	391.97	395.87	389.38	388.22	387.79	399.63
44	3-Apr-04	391.78	390.99	390.72	391.82	391.20	394.51	392.94	391.58	na	391.76	391.39	na	392.13	395.85	389.36	388.29	387.72	399.34
45	4-Apr-04	391.55	390.91	390.66	391.63	391.01	394.00	392.50	391.42	na	391.88	391.34	na	392.03	395.49	388.93	388.09	387.70	398.58
46	5-Apr-04	391.46	390.91	390.64	391.59	390.92	393.63	392.19	391.35	392.97	391.98	391.31	392.16	391.86	395.13	388.67	387.95	387.49	398.02
47	6-Apr-04	391.30	390.90	390.60	391.38	390.76	393.26	391.89	391.23	na	392.03	391.22	na	391.61	394.74	388.35	387.78	386.95	397.47
48	7-Apr-04	391.76	146.56	390.57	391.44	391.15	393.09	391.69	391.18	393.06	392.12	391.23	392.37	391.59	394.66	388.20	387.74	386.44	397.16
49	8-Apr-04	391.98	0.00	390.59	391.41	391.08	393.08	391.69	391.18	393.02	392.14	391.21	392.30	391.57	394.65	388.05	387.74	386.47	397.24
51	10-Apr-04	391.48	389.34	390.35	391.11	390.56	392.28	391.10	390.85	392.96	392.16	391.05	392.31	391.33	394.07	387.29	387.31	386.47	396.24
52	11-Apr-04	391.20	378.25	390.26	390.66	390.32	391.83	390.77	390.64	392.90	392.14	390.94	392.29	391.17	393.70	386.81	387.02	386.14	395.60

note: na= not available
Manual water level readings taken from wells B-21B and B-29B through April 5.
System Down between April 7 and April 8. Data from April 7 through April 11 is not considered useable for PZ-2E.

**WELL LOGS AND
CONSTRUCTION RECORDS
SCREEN ELEVATION SUMMARY**

**Summary of Screen Intervals for Pumping Wells, Groundwater Piezometers, and Monitoring Wells
Sauget Area 2 Groundwater Migration Control System**

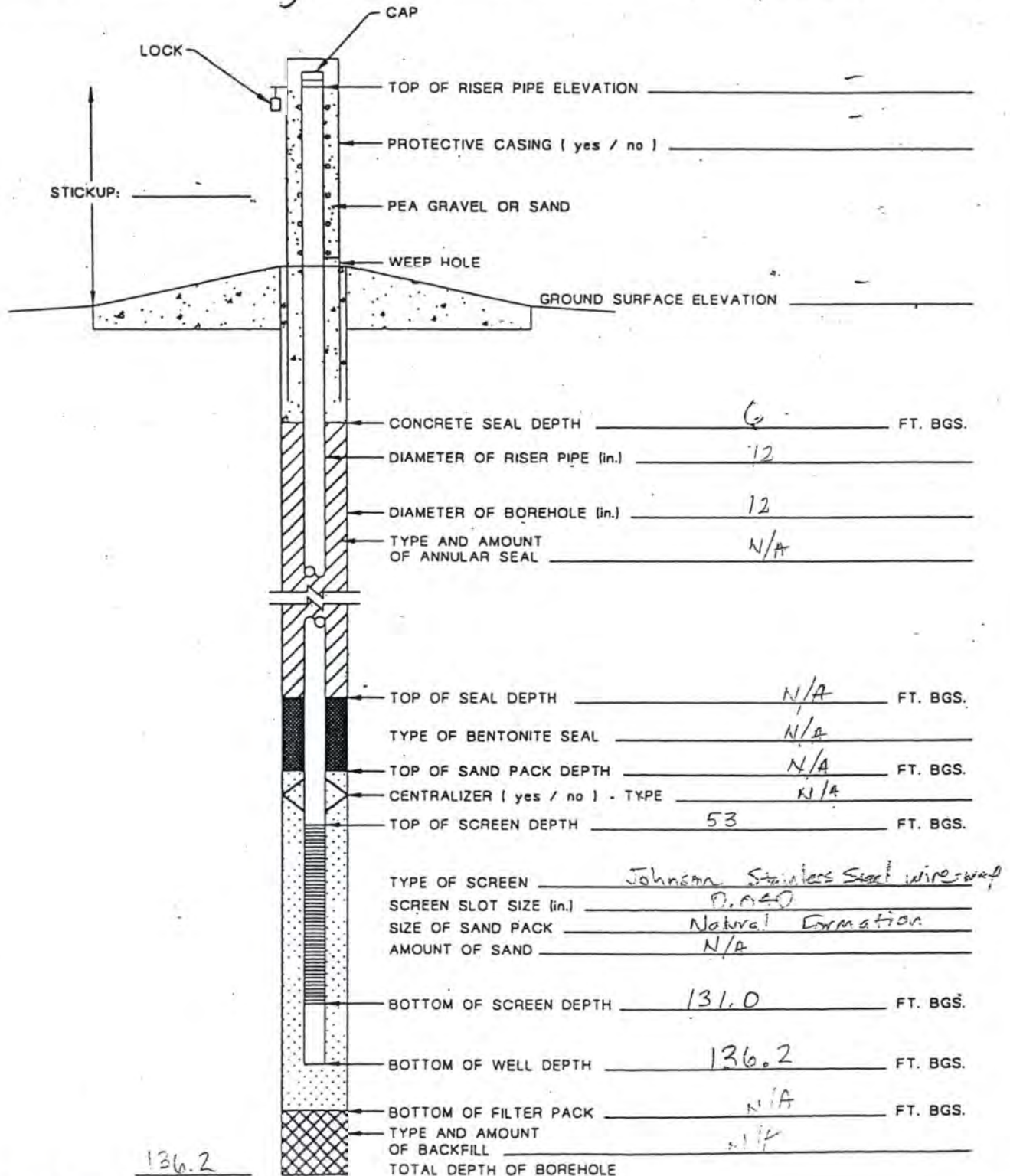
Well ID	Screen Interval (NGVD)	
	top	bottom
Pumping Well		
EW-1	369.02	285.82
EW-2	377.03	308.53
EW-3	364.08	289.28
Groundwater Piezometers		
PZ-1N	364.70	289.70
PZ-1S	367.68	292.68
PZ-2E	364.79	289.79
PZ-2W	367.32	292.32
PZ-3E	367.72	282.72
PZ-3W	369.23	284.23
PZ-4E	368.27	288.89
PZ-4W	368.89	288.89
Existing Monitoring Well		
B-21B	389.27	379.27
B-25B	388.05	378.05
B-26B	384.02	374.02
B-28B	383.98	373.98
B-29B	390.06	380.06
GM-27B	361.24	341.24

**WELL LOGS AND
CONSTRUCTION RECORDS
EXTRACTION WELL EW - 1**



GROUNDWATER MONITORING WELL EW1

SITE NAME: Area 2 SRR LOCATION: SAVOET, IL
CLIENT: SCOTT SURFACE ELEVATION: -
GEOLOGIST: M HADDACK NORTHING: - EASTING: -
DRILLER: J. Workman STATIC WATER LEVEL: - COMPLETION DATE: JUNE 2003
DRILLING COMPANY: Layne DRILLING METHODS: CABLE TOOL



NOTE: DEPTHS MEASURED FROM GROUND SURFACE

Golder Associates Field Boring Log

DEPTH HOLE <u>136</u>	JOB NO. <u>023-9106</u>	PROJECT <u>SITE R AREA 2</u>	BORING NO. <u>EW-1</u>
DEPTH SOIL DRILL <u>136</u>	GA INSP. <u>MT</u>	DRILLING METHOD <u>CABLE TOOL</u>	SHEET <u>1</u> OF <u>10</u>
DEPTH ROCK CORE <u>—</u>	WEATHER <u>var.</u>	DRILLING COMPANY <u>LAYNE</u>	SURFACE ELEV. <u>—</u>
NO. DIST. SA. <u>—</u> UD. SA. <u>—</u>	TEMP. <u>var.</u>	DRILL RIG <u>BUCCYRUS ERIE</u>	DATUM <u>GROUND SURF</u>
DEPTH WL. <u>—</u>	HRS. PROD. <u>—</u>	WT. SAMPLER HAMMER <u>—</u>	DROP <u>—</u>
TIME WL. <u>—</u>	HRS. DELAYED <u>—</u>	WT. CASING HAMMER <u>—</u>	DROP <u>—</u>
			STARTED <u>0900 15-20-03</u>
			COMPLETED <u>1530 15-30-03</u>

SAMPLE TYPES	ABBREVIATIONS	SOIL DESCRIPTION - RANGE OF PROPORTION
A.S. AUGER SAMPLE C.S. CHUNK SAMPLE D.O. DRIVE OPEN D.S. DENISON SAMPLE P.S. PITCHER SAMPLE R.C. ROCK CORE S.T. SLOTTED TUBE T.O. THIN-WALLED, OPEN T.P. THIN-WALLED, PISTON W.S. WASH SAMPLE	BL BLACK BR BROWN C COARSE CA CASING CL CLAY CLY CLAYEY F FINE FRAG FRAGMENTS OL GRAVEL LYD LAYERED LI LITTLE M MEDIUM MIC MICACEOUS MOT MOTTLED NP NON-PLASTIC OG ORANGE ORG ORGANIC PH PRESSURE-HYDRAULIC PM PRESSURE-MANUAL R RED RES RESIDUAL RX ROCK	SA SAMPLE SAT SATURATED SD SAND SI SILT SIY SILTY SM SOME TR TRACE WL WATER LEVEL WH WEIGHT OF HAMMER Y YELLOW "TRACE" - 0-5% "LITTLE" - 5-12% "SOME" - 12-30% "AND" - 30-50% RELATIVE DENSITY VERY LOOSE VLS 0-4 LOOSE LS 4-10 COMPACT CP 10-30 DENSE DN 30-50 VERY DENSE VDN 50 CONSISTENCY VERY SOFT VS SOFT S FIRM FM STIFF ST VERY STIFF VST HARD H FINGER PRESSURE VS EXTRUDES S MOLDS EASILY FM MOLDS ST THUMB INDENTS VST THUMB NAIL INDENT H RESISTS THUMB NAIL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. / ATT		
2	(0.0-52) Firm to stiff, dk yellowish brn and greyish blk, CLAYEY SILT, tr to little f-c sand, little f-c gravel, little organics, damp to moist, (ML)						0.0-4.0 excavated with hand methods, mainly consists of firm, dk yellowish brn and greyish blk, CLAYEY SILT tr to little f-c sand, little f-c gravel, little organics, damp, (ML)	
4							4.0 Begin cable tool methods	
6								
8	- below 8, contains SILTY CLAY interbeds,							
10							~ 52 begin compact to dense, med grey and multi-colored, f-c sand, little f-c gravel, wet, (SW)?	
12								
14							5/22 1600 - 5/23 10:45 ~ 4.5 hrs downtime with bailer stuck in well	
16								
18							~ 18.6	
20								
22								

Golder Associates
Field Boring Log

DEPTH HOLE 136 JOB NO. D239406 PROJECT SITE R AREA 2 BORING NO. EW1
 DEPTH SOIL DRILL 136 GA INSP. _____ DRILLING METHOD CABLE TOOL SHEET 2 OF 4
 DEPTH ROCK CORE _____ WEATHER _____ DRILLING COMPANY _____ SURFACE ELEV. _____
 NO. DIST. SA. _____ UD. SA. _____ TEMP. _____ DRILL RIG _____ DRILLER _____ DATUM _____
 DEPTH WL. _____ HRS. PROD. _____ WT. SAMPLER HAMMER _____ DROP _____ STARTED _____ TIME / DATE
 TIME WL. _____ HRS. DELAYED _____ WT. CASING HAMMER _____ DROP _____ COMPLETED _____

SAMPLE TYPES			ABBREVIATIONS			SOIL DESCRIPTION - RANGE OF PROPORTION								
A.S.	AUGER SAMPLE	BL	BLACK	M	MEDIUM	SA	SAMPLE	"TRACE" - 0 - 5%		"SOME" - 12 - 30%				
C.S.	CHUNK SAMPLE	BR	BROWN	MC	MICACEOUS	SAT	SATURATED	"LITTLE" - 5 - 12%		"AND" - 30-50%				
D.O.	DRIVE OPEN	C	COARSE	MOT	MOTTLED	SD	SAND							
D.S.	DEBROW SAMPLE	CS	CASING	NP	NON-PLASTIC	SI	SILT							
P.S.	PITCHER SAMPLE	CL	CLAY	OG	ORANGE	STF	SILTY	RELATIVE DENSITY	BLOWE	CONSISTENCY	FINGER PRESSURE			
R.C.	ROCK CORE	CLY	CLAYEY	ORG	ORGANIC	SM	SOME	VERY LOOSE	VS	0 4	VERY SOFT	VS	EXTRUDES	
S.T.	SLOTTED TUBE	F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE	LOOSE	LS	4 10	SOFT	S	HOLDS EASILY	
T.O.	THIN-WALLED, OPEN	FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL	COMPACT	CP	10-30	FIRM	FM	HOLDS	
T.P.	THIN-WALLED, PISTON	GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER	DENSE	DN	30-40	STIFF	ST	THUMB INDENTS	
W.S.	WASH SAMPLE	LYD	LAYERED	RES	RESIDUAL	Y	YELLOW	VERY DENSE	VON	50	VERY STIFF	VS	THUMBNAIL, INDENT	
		LI	LITTLE	RK	ROCK						HARD	H	RESISTS THUMBNAIL	

ELEV. DEPTH	DESCRIPTION	BLOWS FT	SAMPLES				DEPTH
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. ATT	
24	SAME AS ABOVE (SAA)						SAME AS ABOVE,
26							
28	- wet below 28						below 28, becomes wet, sand content increasing
30							
32							
34							
36							
38							
40							
42							
44							

Golder Associates
Field Boring Log

DEPTH HOLE 136 JOB NO. 023 91026 PROJECT SITE 2 AREA 2 BORING NO. FW1
 DEPTH SOIL DRILL 136 GA INSP. _____ DRILLING METHOD CABLE TOOL SHEET 5 OF 6
 DEPTH ROCK CORE _____ WEATHER _____ DRILLING COMPANY _____ SURFACE ELEV. _____
 NO. DIST. SA. _____ UD. SA. _____ TEMP. _____ DRILL RIG _____ DRILLER _____ DATUM _____
 DEPTH WL. _____ HRS. PROD. _____ WT. SAMPLER HAMMER _____ DROP _____ STARTED 1 TIME DATE
 TIME WL. _____ HRS. DELAYED _____ WT. CASING HAMMER _____ DROP _____ COMPLETED 1

SAMPLE TYPES		ABBREVIATIONS		SOIL DESCRIPTION - RANGE OF PROPORTION							
A.S.	AUGER SAMPLE	BL	BLACK	M	MEDIUM	SA	SAMPLE	"TRACE"	-0.5%	"SOME"	-12-30%
C.S.	CHUNK SAMPLE	BR	BROWN	MC	MICACEOUS	SAT	SATURATED	"LITTLE"	-5-12%	"AND"	30-50%
D.O.	DRIVE OPEN	C	COARSE	MOT	MOTTLED	SD	SD				
D.S.	DEMOM SAMPLE	CA	CASING	NP	NON-PLASTIC	SI	SILT				
P.B.	PITCHER SAMPLE	CL	CLAY	OG	ORANGE	SV	SILT				
R.C.	ROCK CORE	CLY	CLAYEY	ORG	ORGANIC	SM	SOME	RELATIVE DENSITY	BLOWS	CONSISTENCY	FINGER PRESSURE
S.T.	SLOTTED TUBE	F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE	VERY LOOSE	VLS 0-4	VERY SOFT	VS EXTRUDES
T.O.	THIN-WALLED, OPEN	FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL	LOOSE	LS 4-10	SOFT	S MOLDS EASILY
T.P.	THIN-WALLED, PISTON	GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER	COMPACT	CP 10-30	FIRM	FM HOLDS
W.S.	WASH SAMPLE	LVD	LAYERED	RES	RESIDUAL	Y	YELLOW	DENSE	DN 30-80	STIFF	ST THUMB INDENT
		LI	LITTLE	RX	ROCK			VERY DENSE	VDN 50	VERY STIFF	VST THUMBNAAL, NOENT
										HAND	H RESISTS THUMBNAAL

ELEV. DEPTH	DESCRIPTION	BLOWS FT	SAMPLES				DEPTH
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. ATT	
	SAME AS ABOVE						
94							
96							
98							
100							
102							
104							
106							
108							
110							
112							
114							

Golder Associates Field Boring Log

DEPTH HOLE <u>136</u>	JOB NO. <u>0239006</u>	PROJECT <u>SOLUTION SITE R AREA 2</u>	BORING NO. <u>FW1</u>
DEPTH SOIL DRILL <u>136</u>	GA INSP. <u>MH</u>	DRILLING METHOD <u>CABLE TOOL</u>	SHEET <u>6</u> OF <u>6</u>
DEPTH ROCK CORE <u>-</u>	WEATHER <u>Var.</u>	DRILLING COMPANY <u>LAYNE</u>	SURFACE ELEV. <u>-</u>
NO. DIST. SA. <u>-</u> UD. SA. <u>-</u>	TEMP. <u>Var.</u>	DRILL RIG <u>BUCKEYS ERIE</u>	DRILLER <u>C SKOBY</u>
DEPTH WL. <u>-</u>	HRS. PROD. <u>-</u>	WT. SAMPLER HAMMER <u>-</u>	DROP <u>-</u>
TIME WL. <u>-</u>	HRS. DELAYED <u>-</u>	WT. CASING HAMMER <u>-</u>	DROP <u>-</u>
			DATUM <u>Ground Surf</u>
			STARTED <u>0700 15-20-03</u>
			COMPLETED <u>0800 15-20-03</u>

SAMPLE TYPES		ABBREVIATIONS		SOIL DESCRIPTION - RANGE OF PROPORTION	
A.S. AUGER SAMPLE	BL BLACK	M MEDIUM	SA SAMPLE	"TRACE" - 0-5%	"SOME" - 12-30%
C.S. CHUNK SAMPLE	BR BROWN	MIC MICACEOUS	SAT SATURATED	"LITTLE" - 6-12%	"AND" - 30-50%
D.O. DRIVE OPEN	C COARSE	MOT MOTTLED	SD SAND		
D.S. DENISON SAMPLE	CA CASING	NP NON-PLASTIC	SI SILT	RELATIVE DENSITY	BLOWS
P.S. PITCHER SAMPLE	CL CLAY	OG ORANGE	SIY SILTY	VERY LOOSE VLS 0-4	VERY SOFT VS EXTRUDES
R.C. ROCK CORE	CLY CLAYEY	ORG ORGANIC	SM SOME	LOOSE LS 4-10	SOFT S MOLDS EASILY
S.T. SLOTTED TUBE	F FINE	PH PRESSURE-HYDRAULIC	TR TRACE	COMPACT CP 10-30	FIRM FM MOLDS
T.O. THIN-WALLED, OPEN	FRAG FRAGMENTS	PM PRESSURE-MANUAL	WL WATER LEVEL	DENSE DN 30-50	STIFF ST THUMB INDENTS
T.P. THIN-WALLED, PISTON	GL GRAVEL	R RED	WH WEIGHT OF HAMMER	VERY DENSE VDN 50	VERY STIFF VST THUMBAL INDENT
W.S. WASH SAMPLE	LYD LAYERED	RES RESIDUAL	Y YELLOW		HARD H RESISTS THUMBAL
	LI LITTLE	RX ROCK			

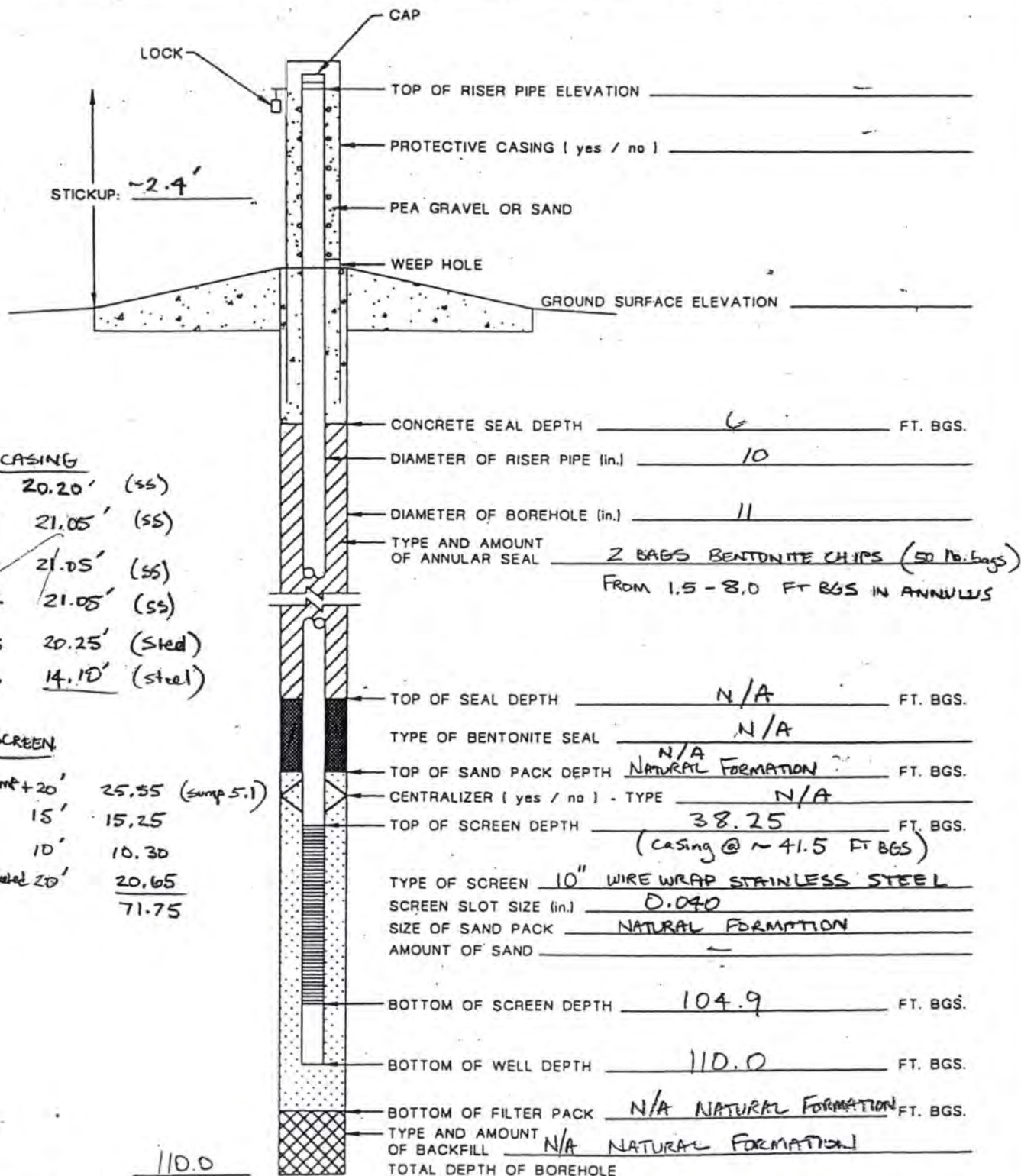
ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN. (FORCE)	REC. / ATT		
116	SAME AS ABOVE							
118								
120								
122								
124								
126	(126-133) interbedded, v. dense, gray and multi-colored, F-C							@ 126 v. dense, gray and multi-colored F-C gravel, rounded grains, 1
128	GRAVEL, little f-c sand, tr cobbles, wet interbedded							@ 127 interbedded with gravelly silty clay, little cobbles
130	with v. stiff, olive gray, SILTY CLAY, little f-c gravel, little cobbles, wet							128 same as above
132								129 same as above
134	(133-136) v. dense F-C GRAVEL interbedded with WEATHERED LIMESTONE							130 same
136								132 more clay, clay content increasing
138								~133 begin weathered limestone
140	END OF BORING @ 136 FT BGS							

**WELL LOGS AND
CONSTRUCTION RECORDS
EXTRACTION WELL EW - 2**



GROUNDWATER MONITORING WELL EW-2

SITE NAME: <u>SOLUTIA SITE R</u>		LOCATION: <u>Sarge, IL</u>	
CLIENT: <u>SOLUTIA</u>		SURFACE ELEVATION: _____	
GEOLOGIST: <u>M HADDON</u>	NORTHING: <u>-</u>	EASTING: <u>-</u>	
DRILLER: <u>J WORKMAN</u>	STATIC WATER LEVEL: <u>-</u>	COMPLETION DATE: <u>11-12-02</u>	
DRILLING COMPANY: <u>LAYNE</u>		DRILLING METHODS: <u>CABLE TOOL</u>	



NOTE: DEPTHS MEASURED FROM GROUND SURFACE

Field Boring Log

DEPTH HOLE 110 JOB NO. 023-9606 PROJECT SOLITA SITE R BORING NO. EW2
 DEPTH SOIL DRILL 110 GA INSP. MNH DRILLING METHOD CABLE TOOL 10" SHEET 1 OF 5
 DEPTH ROCK CORE - WEATHER VARIABLE DRILLING COMPANY LAYNE SURFACE ELEV. -
 NO. DIST. SA. - UD. SA. - TEMP. 28-70 DRILL RIG BUCYRUS ERIE 28 DRILLER J. WORKMAN DATUM -
 DEPTH WL. - HRS. PROD. - WT. SAMPLER HAMMER - DROP - STARTED 1310/11-4-02
 TIME WL. - HRS. DELAYED - WT. CASING HAMMER - DROP - COMPLETED 1

SAMPLE TYPES		ABBREVIATIONS						SOIL DESCRIPTION - RANGE OF PROPORTION							
A.S.	AUGER SAMPLE	BL	BLACK	M	MEDIUM	SA	SAMPLE	"TRACE"	-0.5%						
C.S.	CHUNK SAMPLE	BR	BROWN	MIC	MICACEOUS	SAT	SATURATED	"LITTLE"	-0.5% - 12.30%						
D.O.	DRIVE OPEN	C	COARSE	MOT	MOTTLED	SD	SAND								
D.S.	DENSOSH SAMPLE	CA	CASING	NP	NON-PLASTIC	SI	SILT								
P.S.	PITCHER SAMPLE	CL	CLAY	OR	ORGANIC	STY	SILTY								
R.C.	ROCK CORE	CLY	CLAYEY	ORG	ORGANIC	SM	SOME								
S.T.	SLOTTED TUBE	F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE	RELATIVE DENSITY	BLOWS	CONSISTENCY		FINGER PRESSURE			
T.O.	THIN-WALLED, OPEN	FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL	VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES		
T.P.	THIN-WALLED, PISTON	GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER	LOOSE	LS	4 10	SOFT	S	MOLDS EASILY		
W.S.	WASH SAMPLE	LYD	LAYERED	RES	RESIDUAL	Y	YELLOW	COMPACT	CP	10-30	STIFF	FM	MOLDS		
		LI	LITTLE	RX	ROCK			DENSE	DN	30-50	VERY STIFF	YST	THRUH INNOTS		
								VERY DENSE	VDN	50	HARD	H	RESISTS THRUHAMAL		

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. / ATT		
2	(0.0-38.0) soft to firm, grayish black, <u>SILTY CLAY</u> , moist to wet, (CL)							0.0-38.0 soft grayish blk, SILTY CLAY, moist to wet, (CL)
4								firm and wet below 23, olive gray (38.0-41.0) grades to F-M sand, SILTY (41.0-52.0) compact, F-C SAND, m. thickened wet, SW, olive gray (ALLUVIAL SAND)
6								
8								(52-65) compact to dense, M-C SAND, tr to little F-C gravel, wet olive gray below 65, S&A with tr to little cobbles @ 75, tr wood fragments, wood pieces ~ 1.5" diameter
10								@ 78, thin < 2 inches thick? SILTY CLAY lens
12								below 90, tr f-c gravel, no cobbles below 100, tr cobbles, tr to little f-c gravel
14								109.7-110, SH&A olive gray, SILTY CLAY, tr sand, wet, U
16								casing advanced to 110 ft BGS
18								
20								
22	- below 23, firm and wet - below 25, olive gray							

Golder Associates Field Boring Log

DEPTH HOLE <u>110</u>	JOB NO. <u>023-91001</u>	PROJECT <u>SOLITA SITE R</u>	BORING NO. <u>EW/2</u>
DEPTH SOIL DRILL <u>110</u>	GA INSP. <u>MNH</u>	DRILLING METHOD <u>CABLE TOOL 10"</u>	SHEET <u>2</u> OF <u>5</u>
DEPTH ROCK CORE <u>-</u>	WEATHER <u>VARIABLE</u>	DRILLING COMPANY <u>LAYNE</u>	SURFACE ELEV. <u>-</u>
NO. DIST. SA. <u>-</u>	UD. SA. <u>-</u>	TEMP. <u>28-70</u>	DRILL RIG <u>BUCHUS ERIE 28</u>
DRILLER <u>J. WORKMAN</u>	DATUM <u>-</u>		
DEPTH WL. <u>-</u>	HRS. PROD. <u>-</u>	WT. SAMPLER HAMMER <u>-</u>	DROP <u>-</u>
STARTED <u>-</u>	TIME <u>-</u>	DATE <u>-</u>	
TIME WL. <u>-</u>	HRS. DELAYED <u>-</u>	WT. CASING HAMMER <u>-</u>	DROP <u>-</u>
COMPLETED <u>-</u>			

SAMPLE TYPES		ABBREVIATIONS		SOIL DESCRIPTION - RANGE OF PROPORTION	
A.S. AUGER SAMPLE	BL BLACK	M MEDIUM	SA SAMPLE	"TRACE" - 0-5%	"SOME" - 12-30%
C.S. CHUNK SAMPLE	BR BROWN	MIC MICACEOUS	SAT SATURATED	"LITTLE" - 5-12%	"AND" - 30-50%
D.O. DRIVE OPEN	C COARSE	MOT MOTTLED	SD SAND		
D.S. DENISON SAMPLE	CA CASING	NP NON-PLASTIC	SI SILT		
P.S. PITCHER SAMPLE	CL CLAY	OG ORANGE	ST SILTY	RELATIVE DENSITY	BLOWS
R.C. ROCK CORE	CLY CLAYEY	ORG ORGANIC	SM SOME	VERY LOOSE VLS 0-4	VERY SOFT VS
S.T. SLOTTED TUBE	F FINE	PH PRESSURE-HYDRAULIC	TR TRACE	LOOSE LS 4-10	SOFT S
T.O. THIN-WALLED, OPEN	FRAG FRAGMENTS	PM PRESSURE-MANUAL	WL WATER LEVEL	COMPACT CP 10-30	FIRM FM
T.P. THIN-WALLED, PISTON	GL GRAVEL	R RED	WH WEIGHT OF HAMMER	DENSE DN 30-50	STIFF ST
W.S. WASH SAMPLE	LYD LAYERED	RES RESIDUAL	Y YELLOW	VERY DENSE VDN 50	VERY STIFF VST
	LI LITTLE	RX ROCK			HARD H
					RESISTS THUMBNAI

ELEV. DEPTH	DESCRIPTION	BLOWS FT	SAMPLES				DEPTH DU	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC ATT		
24	(0.0-38.0) soft to firm, grayish black, SILTY CLAY, moist to wet, (CL)							
26								
28	- below 23, firm and wet							
30	- below 25, olive grey							
32								
34								
36	- SILTY CLAY grades to F-C SAND							
38	(38.0-41.0) firm, olive grey, SILTY F-M SAND, wet, (SM)							
40								
42	(41.0-52.0) compact, olive grey with multi-colored grains, F-C SAND, wet, (SW)							
44								

Golder Associates Field Boring Log

DEPTH HOLE <u>110</u>	JOB NO. <u>023-9106</u>	PROJECT <u>SOLUTIA SITE R</u>	BORING NO. <u>EW2</u>
DEPTH SOIL DRILL <u>110</u>	GA INSP. <u>MNH</u>	DRILLING METHOD <u>CABLE TOOL 10"</u>	SHEET <u>3</u> OF <u>5</u>
DEPTH ROCK CORE <u>-</u>	WEATHER <u>VARIABLE</u>	DRILLING COMPANY <u>LAYNE</u>	SURFACE ELEV. <u>-</u>
NO. DIST. SA. <u>-</u>	UD. SA. <u>-</u>	TEMP. <u>28-70</u>	DRILL RIG <u>BUCYRUS ERIE 28</u>
DRILLER <u>J. WORKMAN</u>	DATE <u>-</u>		
DEPTH WL. <u>-</u>	HRS. PROD. <u>-</u>	WT. SAMPLER HAMMER <u>-</u>	DROP <u>-</u>
STARTED <u>-</u>	TIME <u>-</u>	DATE <u>-</u>	
TIME WL. <u>-</u>	HRS. DELAYED <u>-</u>	WT. CASING HAMMER <u>-</u>	DROP <u>-</u>
COMPLETED <u>-</u>	TIME <u>-</u>	DATE <u>-</u>	

SAMPLE TYPES	ABBREVIATIONS	SOIL DESCRIPTION - RANGE OF PROPORTION
A.S. AUGER SAMPLE C.S. CHUNK SAMPLE D.O. DRIVE OPEN D.S. DENISON SAMPLE P.S. PITCHER SAMPLE R.C. ROCK CORE S.T. SLOTTED TUBE T.O. THIN-WALLED, OPEN T.P. THIN-WALLED, PISTON W.S. WASH SAMPLE	BL BLACK BR BROWN C COARSE CA CASING CL CLAY CLY CLAYEY F FINE FRAG FRAGMENTS GL GRAVEL LAY LAYERED LI LITTLE M MEDIUM MIC MICACEOUS MOT MOTTLED NP NON-PLASTIC OG ORANGE ORG ORGANIC PH PRESSURE-HYDRAULIC PM PRESSURE-MANUAL R RED RES RESIDUAL RX ROCK	SA SAMPLE SAT SATURATED SD SAND SI SILT SILT SILTY SM SOME TR TRACE WL WATER LEVEL WH WEIGHT OF HAMMER Y YELLOW "TRACE" - 0-5% "LITTLE" - 5-12% "SOME" - 12-30% "AND" - 30-50% RELATIVE DENSITY VERY LOOSE VLS 0-4 LOOSE LS 4-10 COMPACT CP 10-30 DENSE DN 30-50 VERY DENSE VDN 50 BLOWS CONSISTENCY VERY SOFT VS SOFT S FIRM FM STIFF ST VERY STIFF VST HARD H FINGER PRESSURE VS EXTRUDES S MOLDS EASILY FM MOLDS ST THUMB INDENTS VST THUMB INDENT H RESISTS THUMB INDENT

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. ATT		
48	(41.0-52.0) compact, olive grey with multicolored gains, F-C SAND wet, (SW)							
50								
52	(52.0-109.0) compact to dense, olive grey, M-C SAND, tr to							
54	little f-c gravel, wet (SP)							
56								
58								
60								
62								
64								
66	below 65, tr to little cobbles							
68								

Golder Associates Field Boring Log

DEPTH HOLE <u>110</u>	JOB NO. <u>D23-9606</u>	PROJECT <u>SOLVITA SITE R</u>	BORING NO. <u>EW2</u>
DEPTH SOIL DRILL <u>110</u>	GA INSP. <u>MNH</u>	DRILLING METHOD <u>CABLE TOOL 10"</u>	SHEET <u>4</u> OF <u>5</u>
DEPTH ROCK CORE <u>—</u>	WEATHER <u>VAR.</u>	DRILLING COMPANY <u>LAYNE</u>	SURFACE ELEV. <u>—</u>
NO. DIST. SA. <u>—</u> UD. SA. <u>—</u>	TEMP. <u>28-70</u>	DRILL RIG <u>QUICKS ERIE 28</u>	DRILLER <u>J. WIRMAN</u>
DEPTH WL. <u>—</u>	HRS. PROD. <u>—</u>	WT. SAMPLER HAMMER <u>—</u>	DROP <u>—</u>
TIME WL. <u>—</u>	HRS. DELAYED <u>—</u>	WT. CASING HAMMER <u>—</u>	DROP <u>—</u>
			DATUM <u>—</u>
			STARTED <u>—</u> TIME <u>—</u> DATE <u>—</u>
			COMPLETED <u>—</u> TIME <u>—</u> DATE <u>—</u>

SAMPLE TYPES	ABBREVIATIONS	SOIL DESCRIPTION - RANGE OF PROPORTION
A.S. AUGER SAMPLE C.S. CHURN SAMPLE D.O. DRIVE OPEN D.S. DENISON SAMPLE P.S. PITCHER SAMPLE R.C. ROCK CORE S.T. SLOTTED TUBE T.O. THIN-WALLED, OPEN T.P. THIN-WALLED, PISTON W.S. WASH SAMPLE	BL BLACK BR BROWN C COARSE CA CASHG CL CLAY CLY CLAYEY F FINE FRAG FRAGMENTS GL GRAVEL LAY LAYERED LYD LITTLE U LITTLE	M MEDIUM MIC MICACEOUS MOT MOTTLED NP NON-PLASTIC OG ORANGE ORG ORGANIC PH PRESSURE-HYDRAULIC PM PRESSURE-MANUAL R RED RES RESIDUAL RX ROCK

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC/ATT		
70	(52.0-109.0) compact to dense, olive grey, M-C SAND, tr to little F-C gravel, tr to little cobbles, wet, (SP)							
72								
74	tr wood fragments @ 75							
76								
78	thin, < 2-INCH thick SILTY CLAY lens @ 78							
80								
82								
84								
86								
88								
90	below 90, tr F-C gravel, no cobbles							

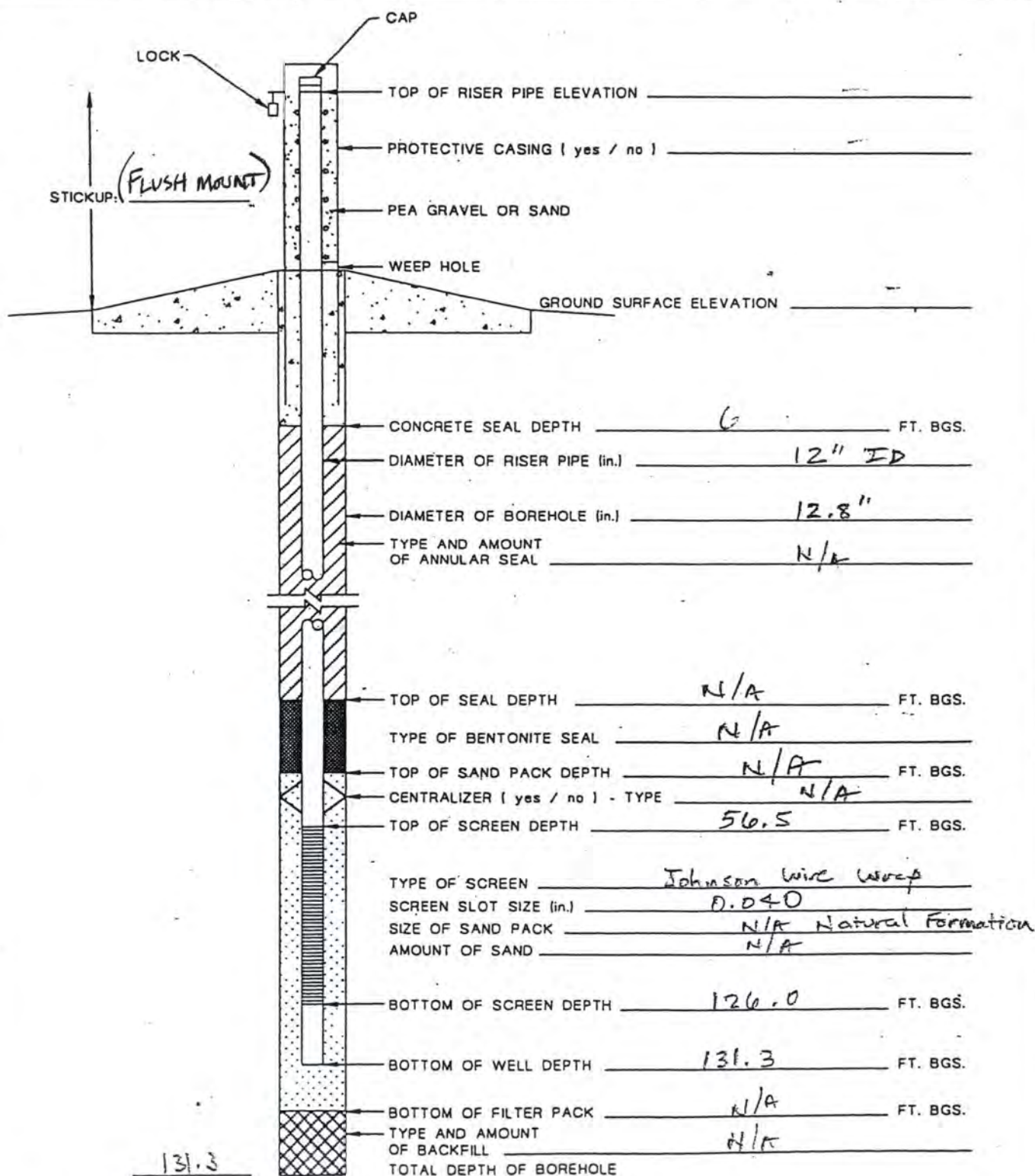
Golder Associates Field Boring Log

DEPTH HOLE <u>110</u>	JOB NO. <u>023-9606</u>	PROJECT <u>SOLUTION SITE</u>	BORING NO. <u>EW 2</u>
DEPTH SOIL DRILL <u>110</u>	GA INSP. <u>MNH</u>	DRILLING METHOD <u>CABLE TOOL 10"</u>	SHEET <u>5</u> OF <u>5</u>
DEPTH ROCK CORE <u>-</u>	WEATHER <u>VAR</u>	DRILLING COMPANY <u>LAYNE</u>	SURFACE ELEV. <u>-</u>
NO. DIST. SA. <u>-</u>	UD. SA. <u>-</u>	TEMP. <u>28-70</u>	DRILL RIG <u>BULCRUS ERIE 28</u>
DRILLER <u>J. WORKMAN</u>	DATUM <u>-</u>	STARTED <u>1210 / 11-9-02</u>	DATE <u>11-12-02</u>
DEPTH WL. <u>-</u>	HRS. PROD. <u>-</u>	WT. SAMPLER HAMMER <u>-</u>	DROP <u>-</u>
TIME WL. <u>-</u>	HRS. DELAYED <u>-</u>	WT. CASING HAMMER <u>-</u>	DROP <u>-</u>
		COMPLETED <u>11-12-02</u>	

SAMPLE TYPES	ABBREVIATIONS	SOIL DESCRIPTION - RANGE OF PROPORTION
A.S. AUGER SAMPLE C.S. CHUCK SAMPLE D.O. DRIVE OPEN D.S. DENISON SAMPLE P.S. PITCHER SAMPLE R.C. ROCK CORE S.T. SLOTTED TUBE T.O. THIN-WALLED, OPEN T.P. THIN-WALLED, PISTON W.S. WASH SAMPLE	BL. BLACK BR. BROWN C. COARSE CA. CASING CL. CLAY CLY. CLAYEY F. FINE FRAG. FRAGMENTS GL. GRAVEL LYD. LAYERED LI. LITTLE M. MEDIUM MIC. MICACEOUS MOT. MOTTLED NP. NON-PLASTIC OG. ORANGE ORG. ORGANIC PH. PRESSURE-HYDRAULIC PM. PRESSURE-MANUAL R. RED RES. RESIDUAL RX. ROCK	SA. SAMPLE SAT. SATURATED SD. SAND SI. SILT SILY. SILTY SM. SOME TR. TRACE WL. WATER LEVEL WH. WEIGHT OF HAMMER Y. YELLOW "TRACE" - 0-5% "LITTLE" - 5-12% "SOME" - 12-30% "AND" - 30-50% RELATIVE DENSITY VERY LOOSE VS 0-4 LOOSE LS 4-10 COMPACT CP 10-30 DENSE DN 30-50 VERY DENSE VDN 50 BLOWS VERY SOFT VS SOFT S FIRM FM STIFF ST VERY STIFF VST HAND FINGER PRESSURE VS EXTRUDES S MOLDS EASILY FM MOLDS ST THUMB INDENTS VST THUMB NAIL INDENT H RESISTS THUMB NAIL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				H FT	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT		
92	(52.0-109.0) compact to dense, olive grey, M-C SAND.							
94	tr F-c gravel, wet, (SP)							
96								
98								
100	below 100, tr cobbles, tr to little F-c gravel							
102								
104								
106								
108	(~109-110?) stiff, olive grey, SILTY CLAY, tr F-c sand, wet, (CL)							Below 108-109, stiff olive grey, SILTY CLAY, tr F-c sand, wet, (CL)
110	END OF BORING @ 110 FT BGS							
112								
114								

**WELL LOGS AND
CONSTRUCTION RECORDS
EXTRACTION WELL EW - 3**

GROUNDWATER MONITORING WELL EW3SITE NAME: AREA 2 SITE RLOCATION: SAVGET, FLCLIENT: SOLUTIASURFACE ELEVATION: -GEOLOGIST: M HADDONNORTHING: -EASTING: -DRILLER: C. SKOBYSTATIC WATER LEVEL: -COMPLETION DATE: JUNE 2003DRILLING COMPANY: LAYNEDRILLING METHODS: CABLE TOOL

NOTE: DEPTHS MEASURED FROM GROUND SURFACE

**Golder Associates
Field Boring Log**

DEPTH HOLE <u>131.5</u>	JOB NO. <u>023-9100</u>	PROJECT <u>SITE R AREA 2</u>	BORING NO. <u>FW3</u>
DEPTH SOIL DRILL _____	GA INSP. <u>MANH</u>	DRILLING METHOD <u>CABLE TOOL</u>	SHEET <u>1</u> OF <u>4</u>
DEPTH ROCK CORE _____	WEATHER <u>Var</u>	DRILLING COMPANY <u>LAYNE</u>	SURFACE ELEV. _____
NO. DIST. SA. _____	UD. SA. _____	TEMP. <u>Var</u>	DRILL RIG <u>BUCYRUS ERIE</u>
DRILLER <u>C. SKOVBY</u>	DATUM <u>Ground Surf</u>	STARTED <u>0800/6-3-03</u>	TIME _____
DEPTH WL. _____	HRS. PROD. _____	WT. SAMPLER HAMMER _____	DROP _____
TIME WL. _____	HRS. DELAYED _____	WT. CASING HAMMER _____	DROP _____
			COMPLETED <u>1000/6-11-03</u>

SAMPLE TYPES

A.S. AUGER SAMPLE
C.S. CHUNK SAMPLE
D.O. DRIVE OPEN
D.S. DENSON SAMPLE
P.S. PITCHER SAMPLE
R.C. ROCK CORE
S.T. SLOTTED TUBE
T.O. THIN-WALLED, OPEN
T.P. THIN-WALLED, PISTON
W.S. WASH SAMPLE

BL BLACK
BR BROWN
C COARSE
CA CASING
CL CLAY
CLY CLAYEY
F FINE
FRAG FRAGMENTS
GL GRAVEL
LYD LAYERED
L LITTLE

ABBREVIATIONS

M MEDIUM
MIC MICACEOUS
MOT MOTTLED
NP NON-PLASTIC
OG ORANGE
ORG ORGANIC
PH PRESSURE-HYDRAULIC
PM PRESSURE-MANUAL
R RED
RES RESIDUAL
RX ROCK

SA SAMPLE
SAT SATURATED
SD SAND
SI SILT
SILY SILTY
SM SOME
TR TRACE
WL WATER LEVEL
WH WEIGHT OF HAMMER
Y YELLOW

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0-5% "SOME" - 12-30%
"LITTLE" - 5-12% "AND" - 30-50%
RELATIVE DENSITY BLOWS CONSISTENCY FINGER PRESSURE
VERY LOOSE VL 0-4 VERY SOFT VS EXTRUDES
LOOSE LS 4-10 SOFT S MOLDS EASILY
COMPACT CP 10-30 FIRM FM MOLDS
DENSE DN 30-50 STIFF ST THUMB INDENTS
VERY DENSE VDN 50 VERY STIFF VST THUMB INDENT
HAND H RESISTS THUMB INDENT

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				H DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. ATT		
2	(0.0-44.0) Firm, black and olive black, CLAYEY SILT, little organic, tr f sand, moist to wet, ML							(0.0-44.0) firm, black and olive black, CLAYEY SILT, little organics, tr f sand, moist to wet, (ML)
4								- wet below 32
6								(44-54) compact, med. green, SILTY F SAND, wet, USA
8								(54-84) dense, med. green and olive, silty f. sand, tr to little f. organic, wet, SW
10								
12								
14								
16								TIMES: 6/2 1215-1700 lost time due to pitman break
18								86- some cobbles @ 90 ft tr cobbles below 90
20								
22								

Casing,
56.5 ft
Screen
to 131 ft

Golder Associates Field Boring Log

DEPTH HOLE 131.3 JOB NO. 0239606 PROJECT SITE 2 AREA 2 BORING NO. EW3
 DEPTH SOIL DRILL 131.3 GA INSP. _____ DRILLING METHOD CABLE TOOL SHEET 2 OF 6
 DEPTH ROCK CORE _____ WEATHER _____ DRILLING COMPANY _____ SURFACE ELEV. _____
 NO. DIST. SA. _____ UD. SA. _____ TEMP. _____ DRILL RIG _____ DRILLER _____ DATUM _____
 DEPTH WL. _____ HRS. PROD. _____ WT. SAMPLER HAMMER _____ DROP _____ STARTED _____ TIME _____ DATE _____
 TIME WL. _____ HRS. DELAYED _____ WT. CASING HAMMER _____ DROP _____ COMPLETED _____ TIME _____ DATE _____

SAMPLE TYPES

A.S. AUGER SAMPLE
 C.S. CHUNK SAMPLE
 D.O. DRIVE OPEN
 D.S. DENISON SAMPLE
 P.S. PITCHER SAMPLE
 R.C. ROCK CORE
 S.T. SLOTTED TUBE
 T.O. THIN-WALLED, OPEN
 T.P. THIN-WALLED, PISTON
 W.S. WASH SAMPLE

BL BLACK
 BR BROWN
 C COARSE
 CA CASING
 CL CLAY
 CLY CLAYEY
 F FINE
 FRAG FRAGMENTS
 GL GRAVEL
 LYD LAYERED
 LI LITTLE

ABBREVIATIONS

M MEDIUM
 MIC MICACEOUS
 MOT MOTTLED
 NP NON-PLASTIC
 OR ORANGE
 ORG ORGANIC
 PH PRESSURE-HYDRAULIC
 PM PRESSURE-MANUAL
 R RED
 RES RESIDUAL
 RX ROCK

SA SAMPLE
 SAT SATURATED
 SD SAND
 SI SILT
 SILTY SILTY
 SM SOME
 TR TRACE
 WL WATER LEVEL
 WH WEIGHT OF HAMMER
 Y YELLOW

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0-5% "SOME" - 12-30%
 "LITTLE" - 5-12% "AND" - 30-50%

RELATIVE DENSITY BLOWS CONSISTENCY FINGER PRESSURE
 VERY LOOSE VLS 0-4 VERY SOFT VS EXTRUDES
 LOOSE LS 4-10 SOFT FM MOLDS EASILY
 COMPACT CP 10-30 FIRM FM MOLDS
 DENSE DN 30-50 STIFF ST THUMBS INDENTS
 VERY DENSE VDN 50 VERY STIFF VST THUMBNAI, INDENT
 HARD H RESISTS THUMBNAI

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN. (FORCE)	REC. ATT		
24	SAME AS ABOVE							- SA-A -
26								
28								
30								
32	below 32, same as above & wet							wet
34								
36								
38								
40								
42								
44	grades to (44-54) compact med. grey, SILTY F SAND, wet, (SM)							@ 44 grades to compact, med. grey, SILTY F SAND, wet, (SM)
46								

Golder Associates Field Boring Log

DEPTH HOLE 131.3 JOB NO. 023 960 PROJECT SITE R AREA 2 BORING NO. EW3
 DEPTH SOIL DRILL 131.3 GA INSP. _____ DRILLING METHOD CABLE TOOL SHEET 3 OF 6
 DEPTH ROCK CORE _____ WEATHER _____ DRILLING COMPANY _____ SURFACE ELEV. _____
 NO. DIST. SA. _____ UD. SA. _____ TEMP. _____ DRILL RIG _____ DRILLER _____ DATUM _____
 DEPTH WL. _____ HRS. PROD. _____ WT. SAMPLER HAMMER _____ DROP _____ STARTED TIME 1 DATE _____
 TIME WL. _____ HRS. DELAYED _____ WT. CASING HAMMER _____ DROP _____ COMPLETED 1

SAMPLE TYPES

A.S. AUGER SAMPLE
 C.S. CHUNK SAMPLE
 D.O. DRIVE OPEN
 D.S. DENISON SAMPLE
 P.S. PITCHER SAMPLE
 R.C. ROCK CORE
 S.T. SLOTTED TUBE
 T.O. THIN-WALLED, OPEN
 T.P. THIN-WALLED, PISTON
 W.S. WASH SAMPLE

BL BLACK
 BR BROWN
 C COARSE
 CA CASING
 CL CLAY
 CLY CLAYEY
 F FINE
 FRAG FRAGMENTS
 GL GRAVEL
 LYD LAYERED
 LI LITTLE

ABBREVIATIONS

M MEDIUM
 MIC MICACEOUS
 MOT MOTTLED
 NP NON-PLASTIC
 OG ORANGE
 ORG ORGANIC
 PH PRESSURE-HYDRAULIC
 PM PRESSURE-MANUAL
 R RED
 RES RESIDUAL
 RX ROCK

SA SAMPLE
 SAT SATURATED
 SO SAND
 SI SILT
 SIY SILTY
 SM SOME
 TR TRACE
 WL WATER LEVEL
 WH WEIGHT OF HAMMER
 Y YELLOW

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0-5% "SOME" - 12-30%
 "LITTLE" - 5-12% "AND" - 30-50%
 RELATIVE DENSITY BLOWS CONSISTENCY FINGER PRESSURE
 VERY LOOSE VLS 0-4 VERY SOFT VS EXTRUDES
 LOOSE LS 4-10 SOFT S HOLDS EASILY
 COMPACT CP 10-30 FIRM FM HOLDS
 DENSE DN 30-50 STIFF ST THUMBS INDENTS
 VERY DENSE VDN 50 VERY STIFF VST THUMBNAI, INDENT
 HARD H RESISTS THUMBNAI

ELEV. DEPTH	DESCRIPTION	BLOWS FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN. (FORCE)	REC. ATT		
48	(44-54) compact, med. gray, SILTY F SAND, wet, (SW)							
50								
52								
54	(54-130) dense to v. dense, med gray and multi-colored, F.C SAND, tr to little F.C gravel, wet (SW)							at 54 begin dense to v. dense F.C SAND, tr to little F.C gravel, (SW)
56								
58								
60								
62								
64								
66								
68								

Golder Associates Field Boring Log

EPH HOLE <u>131.3</u>	JOB NO. <u>0239606</u>	PROJECT <u>SITE R AREA 2</u>	BORING NO. <u>EW3</u>
EPH SOIL DRILL <u>131.3</u>	GA INSP. _____	DRILLING METHOD <u>CABLE TOOL</u>	SHEET <u>4</u> OF <u>6</u>
EPH ROCK CORE _____	WEATHER _____	DRILLING COMPANY _____	SURFACE ELEV. _____
Q.DIST.SA. _____	UD.SA. _____	TEMP. _____	DRILL RIG _____
DRILLER _____	DATUM _____	TIME WL. _____	HRS. PROD. _____
WT. SAMPLER HAMMER _____	DROP _____	STARTED _____	TIME _____
DATE _____	COMPLETED _____	HRS. DELAYED _____	WT. CASING HAMMER _____
DROP _____			

SAMPLE TYPES

1.S. AUGER SAMPLE
 2.S. CHUCK SAMPLE
 3.O. DRIVE OPEN
 4.S. DENISON SAMPLE
 5.S. PITCHER SAMPLE
 6.C. ROCK CORE
 7.T. SLOTTED TUBE
 8.D. THIN-WALLED, OPEN
 9.P. THIN-WALLED, PISTON
 W.S. WASH SAMPLE

BL. BLACK
 BR. BROWN
 C. COARSE
 CA. CASING
 CL. CLAY
 CLY. CLAYEY
 F. FINE
 FRAG. FRAGMENTS
 GL. GRAVEL
 LYD. LAYERED
 LI. LITTLE

ABBREVIATIONS

M. MEDIUM
 MIC. MICACEOUS
 MOT. MOTTLED
 NP. NON-PLASTIC
 OG. ORANGE
 ORG. ORGANIC
 PH. PRESSURE-HYDRAULIC
 PM. PRESSURE-MANUAL
 R. RED
 RES. RESIDUAL
 RX. ROCK

SA. SAMPLE
 SAT. SATURATED
 SD. SAND
 SI. SILT
 SILTY. SILTY
 SM. SOME
 TR. TRACE
 WL. WATER LEVEL
 WH. WEIGHT OF HAMMER
 Y. YELLOW

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
 "LITTLE" - 5 - 12% "AND" - 30 - 50%
 RELATIVE DENSITY BLOWS CONSISTENCY FINGER PRESSURE
 VERY LOOSE VLS 0-4 VERY SOFT VS EXTRUDES
 LOOSE LS 4-10 SOFT SM MOLDS EASILY
 COMPACT CP 10-30 FIRM FM MOLDS
 DENSE DN 30-50 STIFF ST THUMB INDENTS
 VERY DENSE VDN 50 VERY STIFF VST THUMBAL INDENT
 HAND H RESISTS THUMBAL

ELEV. DEPTH	DESCRIPTION	BLOWS FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. ATT		
-70	SAME AS ABOVE							SAME
-72								
-74								
-76								
-78								
-80								
-82								
-84								
-86								
-88	88-90, SAME but some cobbles in this interval							88-90, occasional cobbles encountered
-90	below 90, tr cobbles							below 90, tr cobbles
-92								
-94								
-96								
-98								
-100								

Golder Associates Field Boring Log

EPTH HOLE 131.3 JOB NO. 023 9606 PROJECT SITE 2 AREA 2 BORING NO. FW 3
 EPTH SOIL DRILL 131.3 GA INSP. _____ DRILLING METHOD CABLE TOOL SHEET 5 OF 6
 EPTH ROCK CORE _____ WEATHER _____ DRILLING COMPANY _____ SURFACE ELEV. _____
 O.DIST.SA. _____ UD.SA. _____ TEMP. _____ DRILL RIG _____ DRILLER _____ DATUM _____
 EPTH WL. _____ HRS. PROD. _____ WT. SAMPLER HAMMER _____ DROP _____ STARTED _____ TIME / DATE _____
 TIME WL. _____ HRS. DELAYED _____ WT. CASING HAMMER _____ DROP _____ COMPLETED _____ TIME / DATE _____

SAMPLE TYPES

A.S. AUGER SAMPLE
 C.S. CHUNK SAMPLE
 D.O. DRIVE OPEN
 D.S. DENISON SAMPLE
 P.S. PITCHER SAMPLE
 R.C. ROCK CORE
 S.T. SLOTTED TUBE
 T.O. THIN-WALLED, OPEN
 T.P. THIN-WALLED, PISTON
 W.S. WASH SAMPLE

BL BLACK
 BR BROWN
 C COARSE
 CA CASING
 CL CLAY
 CLY CLAYEY
 F FINE
 FRAG FRAGMENTS
 GL GRAVEL
 LYD LAYERED
 LI LITTLE

ABBREVIATIONS

M MEDIUM
 MIC MICACEOUS
 MOT MOTTLED
 NP NON-PLASTIC
 ORG ORANGE
 ORG ORGANIC
 PH PRESSURE-HYDRAULIC
 PM PRESSURE-MANUAL
 R RED
 RES RESIDUAL
 RX ROCK

SA SAMPLE
 SAT SATURATED
 SD SAND
 SI SILT
 ST SILTY
 SM SOME
 TR TRACE
 WL WATER LEVEL
 WH WEIGHT OF HAMMER
 Y YELLOW

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0-5% "SOME" - 12-30%
 "LITTLE" - 5-12% "AND" - 30-50%
 RELATIVE DENSITY BLOWS CONSISTENCY FINGER PRESSURE
 VERY LOOSE VLS 0-4 VERY SOFT VS EXTRUDES
 LOOSE LS 4-10 SOFT S MOLDS EASILY
 COMPACT CP 10-30 FIRM FM MOLDS
 DENSE DN 30-50 STIFF ST THUMB INDENTS
 VERY DENSE VDN 50 VERY STIFF VST THUMBAL INDENT
 HARD H RESISTS THUMBAL

ELEV. DEPTH	DESCRIPTION	BLOWS FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. ATT		
	SAME AS ABOVE							SAT ↓
94								
96								
98								
100								
102								
104								
106								
108								
110								
112								
114								

Golder Associates Field Boring Log

DEPTH HOLE 131.3 JOB NO. 0239606 PROJECT SITE R AREA 2 BORING NO. E1413
 DEPTH SOIL DRILL 131.3 GA INSP. MH DRILLING METHOD CABLE TOOL SHEET 10 OF 10
 DEPTH ROCK CORE — WEATHER Var DRILLING COMPANY LAYNE SURFACE ELEV. —
 NO. DIST. SA. — UD. SA. — TEMP. Var DRILL RIG BUCYRUS ERIE DRILLER C. SKOUBY DATUM Ground Surf
 DEPTH WL. — HRS. PROD. — WT. SAMPLER HAMMER — DROP — STARTED 0800/6-3-88
 TIME WL. — HRS. DELAYED — WT. CASING HAMMER — DROP — COMPLETED 1600/6-11-88

SAMPLE TYPES

A.S. AUGER SAMPLE
 C.S. CHUNK SAMPLE
 D.O. DRIVE OPEN
 D.S. DENISON SAMPLE
 P.S. PITCHER SAMPLE
 R.C. ROCK CORE
 S.T. SLOTTED TUBE
 T.O. THIN-WALLED, OPEN
 T.P. THIN-WALLED, PISTON
 W.S. WASH SAMPLE

BL BLACK
 BR BROWN
 C COARSE
 CA CASING
 CL CLAY
 CLY CLAYEY
 F FINE
 FRAG FRAGMENTS
 GL GRAVEL
 LYD LAYERED
 L LITTLE

ABBREVIATIONS

M MEDIUM
 MIC MICACEOUS
 MOT MOTTLED
 NP NON-PLASTIC
 OG ORANGE
 ORG ORGANIC
 PH PRESSURE-HYDRAULIC
 PM PRESSURE-MANUAL
 R RED
 RES RESIDUAL
 RX ROCK

SA SAMPLE
 SAT SATURATED
 SD SAND
 SI SILT
 SILT SILTY
 SM SOME
 TR TRACE
 WL WATER LEVEL
 WH WEIGHT OF HAMMER
 Y YELLOW

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
 "LITTLE" - 5 - 12% "AND" - 30-50%
 RELATIVE DENSITY BLOWS CONSISTENCY FINGER PRESSURE
 VERY LOOSE VLS 0-4 VERY SOFT VS EXTRUDES
 LOOSE LS 4-10 SOFT S MOLDS EASILY
 COMPACT CP 10-30 FIRM FM MOLDS
 DENSE DN 30-50 STIFF ST THUMB INDENTS
 VERY DENSE VDN 50 VERY STIFF VST THUMBAL INDENT
 HARD H RESISTS THUMBAL

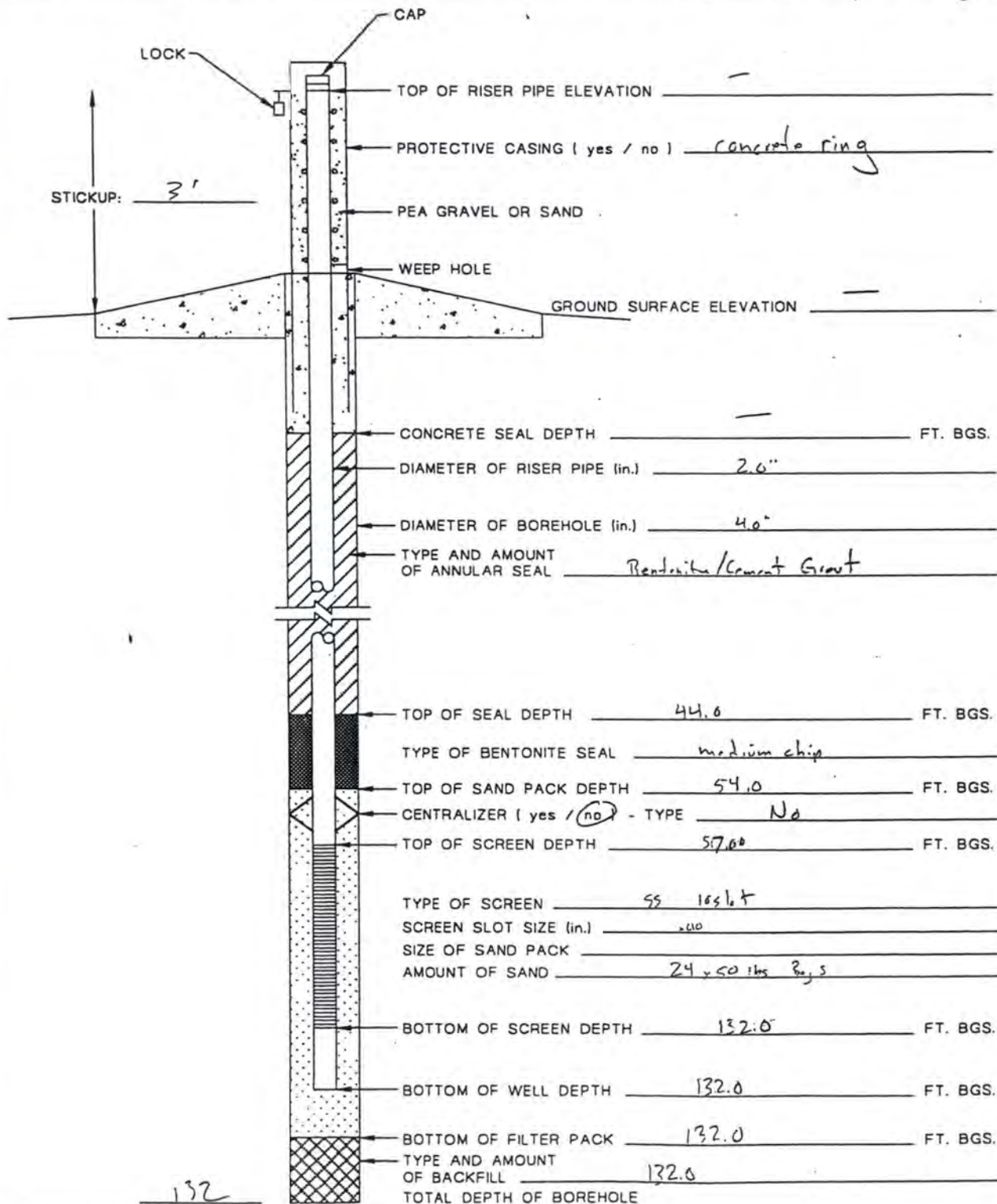
ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC ATT		
116	v. dense, med gray and multi-colored, F-C SAND, little f.c gravel, tr cobbles, wet (5w)							SAA ↓
118								
120								
122								
124								
126								
128								
130	(130-131.3) SAME with few weathered LIMESTONE FRAGMENTS							@ ~130 drilling becomes difficult, few weathered limestone fragments in samples
132	END OF BORING @ 131.3 FT BGS							
134								
136								

**WELL LOGS AND
CONSTRUCTION RECORDS
WATER-LEVEL PIEZOMETER PZ - 1N**



GROUNDWATER MONITORING WELL PW

SITE NAME: S.D.R. LOCATION: South of Concrete Wall/In Road
CLIENT: Solutia SURFACE ELEVATION: -
GEOLOGIST: SAP NORTHING: - EASTING: -
DRILLER: J CRANE STATIC WATER LEVEL: - COMPLETION DATE: 7-9-03
DRILLING COMPANY: Roberts DRILLING METHODS: 6.5" Mud Rotary



NOTE: DEPTHS MEASURED FROM GROUND SURFACE

**Golder Associates
Field Boring Log**

DEPTH HOLE <u>126.5'</u>	JOB NO. <u>AREA 2</u>	PROJECT <u>MU PZ Installation</u>	BORING NO. <u>P1-N</u>
DEPTH SOIL DRILL <u>126.5'</u>	GA INSP. <u>MRP</u>	DRILLING METHOD <u>HSA / MUR ROTARY</u>	SHEET <u>1</u> OF <u>3</u>
DEPTH ROCK CORE <u>-</u>	WEATHER <u>Cloudy</u>	DRILLING COMPANY <u>REDI.</u>	SURFACE ELEV. <u>-</u>
NO. DIST. SA <u>23</u> UD. SA <u>MA</u>	TEMP. <u>mid 80's</u>	DRILL RIG <u>CME 75</u>	DRILLER <u>M Cooper</u>
DEPTH WL. <u>14.0' BGS</u>	HRS. PROD. <u>-</u>	WT. SAMPLER HAMMER <u>140 lb</u>	DROP <u>Auto</u>
TIME WL. <u>-</u>	HRS. DELAYED <u>-</u>	WT. CASING HAMMER <u>NA</u>	DROP <u>-</u>
			DATUM <u>-</u>
			STARTED <u>6/20/03</u> <u>6:18 AM</u>
			COMPLETED <u>1445</u> <u>1:18 PM</u>

SAMPLE TYPES			ABBREVIATIONS			SOIL DESCRIPTION - RANGE OF PROPORTION		
A.S. AUGER SAMPLE	BL BLACK	M MEDIUM	SA SAMPLE	"TRACE" - 0-5% "SOME" - 12-30%		RELATIVE DENSITY	BLOWS	CONSISTENCY
D.S. CHURN SAMPLE	BR BROWN	MIC MICACEOUS	SAT SATURATED	"LITTLE" - 5-12% "AND" - 30-50%		VERY LOOSE	VLS 0-4	VERY SOFT
D.D. DRIVE OPEN	C COARSE	MOT MOTTLED	SD SAND			LOOSE	LS 4-10	SOFT
D.S. DENISON SAMPLE	CA CASING	NP NON-PLASTIC	SI SILT			COMPACT	CP 10-30	FWM
P.S. RITCHER SAMPLE	CL CLAY	OG ORANGE	SH SILTY			DENSE	DN 30-50	STWF
R.C. ROCK CORE	CLY CLAYEY	ORG ORGANIC	SM SOME			VERY DENSE	VDN 50	VERY STIFF
S.T. SLOTTED TUBE	F FINE	PH PRESSURE-HYDRAULIC	TR TRACE			FINGER PRESSURE		
T.D. THIN-WALLED, OPEN	FRAG FRAGMENTS	PM PRESSURE-MANUAL	WL WATER LEVEL			EXTRUDES	VS	HOLDS EASILY
T.P. THIN-WALLED, PISTON	GL GRAVEL	R RED	WH WEIGHT OF HAMMER			MOLDS	FM	HOLDS
W.S. WASH SAMPLE	LYD LAYERED	RES RESIDUAL	Y YELLOW			THUMB INERTS	ST	THUMB INERTS
	LI LITTLE	ROCK				RESISTS THUMB INERTS	VST	RESISTS THUMB INERTS

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER FEET (IN FORCE)	REC. ATT.		
5	(0-?) v soft to firm, dk gray, SILT, & f sand, moist to wet, (mc) (alluvium)	6 12	1	SS	3, 3, 4, 8	2 1/2	5	Soft, moist, dk. gray SILT (ML) w/ trace f. fine grained sand
10		2 6	2	SS	1, 1, 2, 4	2 1/2	10	Same as above
15		2 3	3	SS	1, 1, 2, 1	2 1/2	15	Becomes v. soft
20	H ₂ O @ 19.0' bgs.	14 24	4	SS	4, 10, 11, 13	2 1/2	20	becomes Firm & wet
25	(? - ?) v. soft, to firm, CLAY, & silt, & f sand, wet (CL) (alluvium) - f. m sand tense @ 30'	4 7	5	SS	2, 2, 3, 4	2 1/2	25	Soft, wet, gray CLAY (CL) w/ trace silt & f. fine grained sand
30		6 21	6	SS	2, 4, 7, 14	1 1/2	30	Same as above compact, wet, gray, f. to m. grained SAND (SP)
35		2 3	7	SS	1, 1, 1, 2	2 1/2	35	v. soft, wet, gray CLAY (CL) w/ trace silt & f. fine grained sand
40		2 5	8	SS	1, 1, 2, 3	2 1/2	40	becomes soft
45		2 16	9	SS	1, 1, 4, 12	2 1/2	45	becomes Firm
50	(? - ?) compact to dense, gray f. c SAND let. (SW) (alluvium) - grades coarser with depth.	24 50	10	SS	9, 15, 20, 30	1 1/2	50	Dense, wet, gray, f. to m. grained SAND (SP) w/ chert fragments (trace)
55		24 39	11	SS	14, 15, 17, 32	1 1/2	55	becomes f. to c grained SAND (SP)

**Golder Associates
Field Boring Log**

DEPTH HOLE <u>126.5</u>	JOB NO. <u>Area 2</u>	PROJECT <u>MW/PZ Installation</u>	BORING NO. <u>P10</u>
DEPTH SOIL DRILL <u>126.5</u>	GA INSP. <u>M&E</u>	DRILLING METHOD <u>HSA Mud Rotary</u>	SHEET <u>2</u> OF <u>3</u>
DEPTH ROCK CORE <u>-</u>	WEATHER <u>P Cloudy</u>	DRILLING COMPANY <u>Roberts</u>	SURFACE ELEV. <u>-</u>
NO. DIST. SA. <u>23</u>	UD. SA. <u>-</u>	TEMP. <u>mid 80's</u>	DRILL RIG <u>CME 75</u>
DRILLER <u>M Cooper</u>	DATUM <u>-</u>	WT. SAMPLER HAMMER <u>140 lb</u>	DROP <u>Auto</u>
DEPTH WL. <u>19.0 BGS</u>	HRS. PROD. <u>-</u>	WT. CASING HAMMER <u>NA</u>	DROP <u>-</u>
TIME WL. <u>-</u>	HRS. DELAYED <u>-</u>	COMPLETED <u>16.17.03</u>	DATE <u>1445 16.18.03</u>

SAMPLE TYPES		ABBREVIATIONS		SOIL DESCRIPTION - RANGE OF PROPORTION	
A.S. AUGER SAMPLE	BL. BLACK	M. MEDIUM	SA. SAMPLE	"TRACE" - 0-5%	"SOME" - 12-30%
C.S. CHUNK SAMPLE	BR. BROWN	MIC. MICACEOUS	SAT. SATURATED	"LITTLE" - 5-12%	"AND" - 30-50%
D.O. DRIVE OPEN	C. COARSE	MOT. MOTTLED	SD. SAND	RELATIVE DENSITY	BLOWS
D.S. DENISON SAMPLE	CA. CASING	NP. NON-PLASTIC	SI. SILT	VERY LOOSE	VS. 0-4
P.S. RITCHER SAMPLE	CL. CLAY	OG. ORANGE	ST. SILTY	LOOSE	LS 4-10
R.C. ROCK CORE	CLY. CLAYEY	ORG. ORGANIC	SM. SOME	COMPACT	CP 10-30
S.T. SLOTTED TUBE	F. FINE	PH. PRESSURE-HYDRAULIC	TR. TRACE	DENSE	DN 30-50
T.D. THIN-WALLED, OPEN	FRAG. FRAGMENTS	PM. PRESSURE-MANUAL	WL. WATER LEVEL	VERY DENSE	VDN 50
T.P. THIN-WALLED, PISTON	GL. GRAVEL	R. RED	WH. WEIGHT OF HAMMER	HARD	H
W.S. WASH SAMPLE	LYD. LAYERED	RES. RESIDUAL	Y. YELLOW	VERY STIFF	VST
	LI. LITTLE	ROCK		H	RESISTS THUMBNAI

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. ATT		
60		35 28	12	SS	19, 16, 12, 16	18/24	60	Same as above
65		22 32	13	SS	9, 13, 17, 15		65	becomes compact
70		17 19	14	SS	8, 9, 13, 6		70	Same as above
75		21 19	15	SS	10, 11, 10, 9		75	Same as above
80		18 16	16	SS	10, 8, 8, 8		80	Same as above
85		45 41	17	SS	22, 23, 23, 18		85	becomes dense & brown
90		17 29	18	SS	8, 11, 16, 13		90	becomes compact & grades coarser w/ little f. grains
95		28 39	19	SS	13, 15, 17, 22		95	becomes dense
100		32 29	20	SS	14, 18, 17, 12		100	Same as above
105		38 55	21	SS	15, 23, 26, 29		105	becomes v. dense w/ trace f. grains
110		37 50+	22	SS	15, 24, 50 (24)		110	Same as above
	Limestone boulders and rubble, no recovery	N/A	-	-	N/A	N/A	115	LS Boulders & cobbles

Field Boring Log

DEPTH HOLE <u>126.5'</u>	JOB NO. <u>Area 2</u>	PROJECT <u>MW & PZ Installation</u>	BORING NO. <u>PI-N</u>
DEPTH SOIL DRILL <u>126.5'</u>	GA INSP. <u>MRF</u>	DRILLING METHOD <u>HSA / Mud Rotary</u>	SHEET <u>3</u> OF <u>3</u>
DEPTH ROCK CORE <u>-</u>	WEATHER <u>P. Cloudy</u>	DRILLING COMPANY <u>REDI</u>	SURFACE ELEV. <u>-</u>
NO. DIST. SA. <u>23</u> UD. SA. <u>n/a</u>	TEMP. <u>mid 80's</u>	DRILL RIG <u>CME 75</u>	DRILLER <u>M. Cooper</u>
DEPTH WL. <u>19.0' bgs</u>	HRS. PROD. <u>-</u>	WT. SAMPLER HAMMER <u>140 lb</u>	DROP <u>Auto</u>
TIME WL. <u>-</u>	HRS. DELAYED <u>-</u>	WT. CASING HAMMER <u>n/a</u>	DROP <u>-</u>
			DATUM <u>-</u>
			STARTED <u>6-17-03</u>
			COMPLETED <u>4:45 PM 6-18-03</u>

SAMPLE TYPES		ABBREVIATIONS		SOIL DESCRIPTION - RANGE OF PROPORTION	
A.S. AUGER SAMPLE	BL BLACK	M MEDIUM	SA SAMPLE	"TRACE" - 0 - 5%	"SOME" - 12 - 30%
C.S. CHUNK SAMPLE	BR BROWN	MC MICACEOUS	SAT SATURATED	"LITTLE" - 5 - 12%	"A LOT" - 30-50%
D.O. DRIVE OPEN	C COARSE	MOT MOTTLED	SD SAND		
D.S. DENISON SAMPLE	CA CASING	NP NON-PLASTIC	SI SILT		
P.S. RITCHER SAMPLE	CL CLAY	OR ORGANIC	SLT SILTY	RELATIVE DENSITY	CONSISTENCY
R.C. ROCK CORE	CLY CLAYEY	ORG ORGANIC	SM SOME	VERY LOOSE LS 4	VS VERY SOFT VS
S.T. SLOTTED TUBE	F FINE	PH PRESSURE-HYDRAULIC	TR TRACE	LOOSE LS 4 10	S MOLD'S EASILY
T.O. THIN-WALLED, OPEN	FRAG FRAGMENTS	PM PRESSURE-MANUAL	WL WATER LEVEL	COMPACT CP 10-30	ST M MOLDS
T.P. THIN-WALLED, PISTON	GL GRAVEL	R RED	WH WEIGHT OF HAMMER	DENSE DN 30-60	FM THIN RIGIDS
W.S. WASH SAMPLE	LYD LAYERED	RES RESIDUAL	Y YELLOW	VERY DENSE VDN 50	VST THUMBNAI, WIGHT
	LI LITTLE	RX ROCK			H RESISTS THUMBNAI

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC ATT		
		n/a	-	-	n/a	n/a	115	
120	(2-3) firm to v. stiff, brown CLAY, tr silty tr f-m sand, wet, (CL) (athyrin)	18 51	23	SS	8, 10, 22, 29	24/ 24	120	Firm, wet, brown CLAY (CL) w/ trace silt d.f. to m. grained sand becomes v. stiff
125	Limestone Boulders and cobbles, no recovery	n/a	-	-	n/a	n/a	125	LS Boulders & Cobbles
<p>TOR @ 126.5' bgs</p>								

**WELL LOGS AND
CONSTRUCTION RECORDS
WATER-LEVEL PIEZOMETER PZ - 1S**



GROUNDWATER MONITORING WELL: P15

SITE NAME: SITE R

LOCATION: S & Road - N Piezo Dr

CLIENT: SOLUTIA

SURFACE ELEVATION: -

GEOLOGIST: JAC

NORTHING: -

EASTING: -

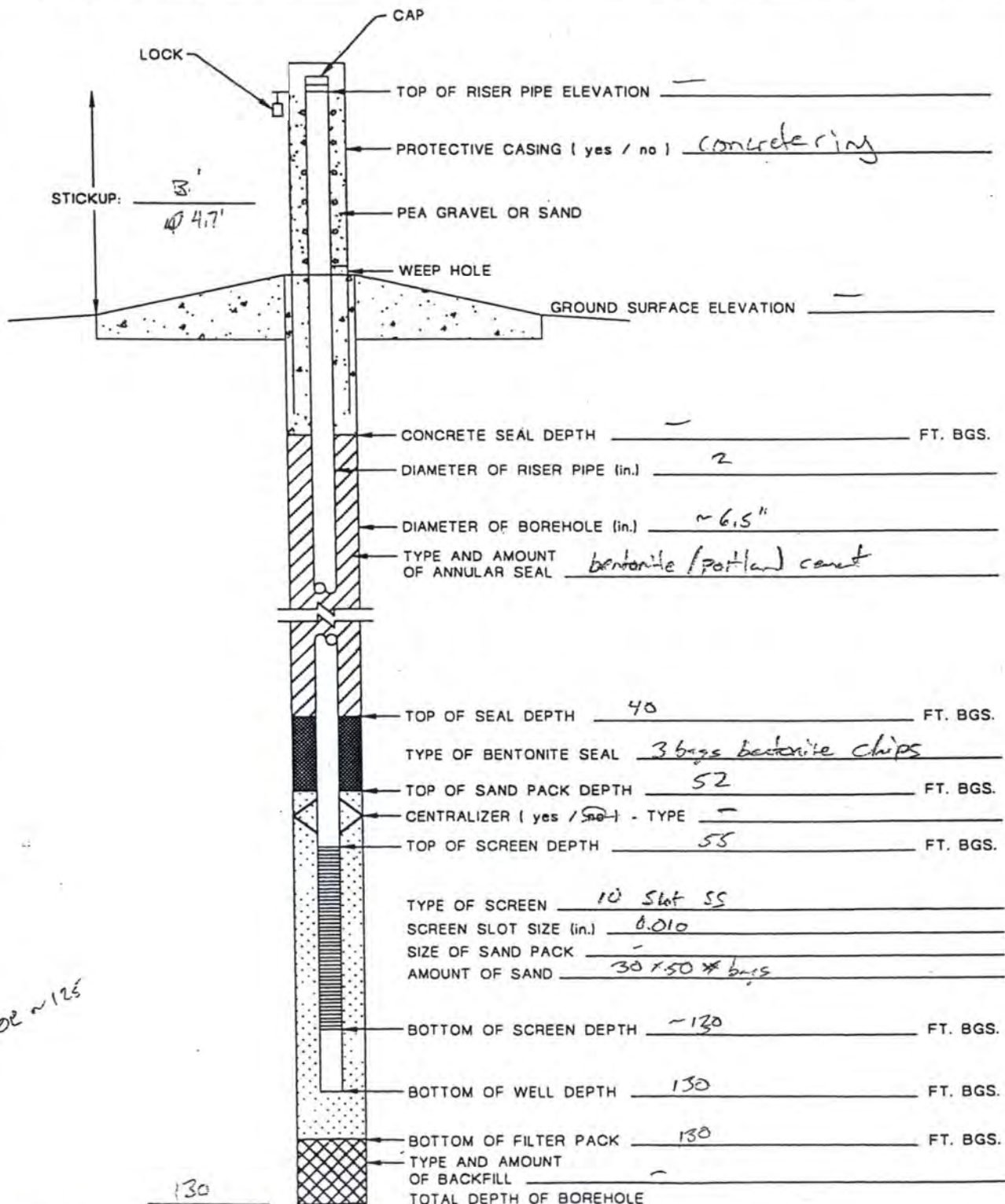
DRILLER: J CRANE

STATIC WATER LEVEL: -

COMPLETION DATE: 6-27-03

DRILLING COMPANY: Roberts

DRILLING METHODS: 6.5" Mud Rotary



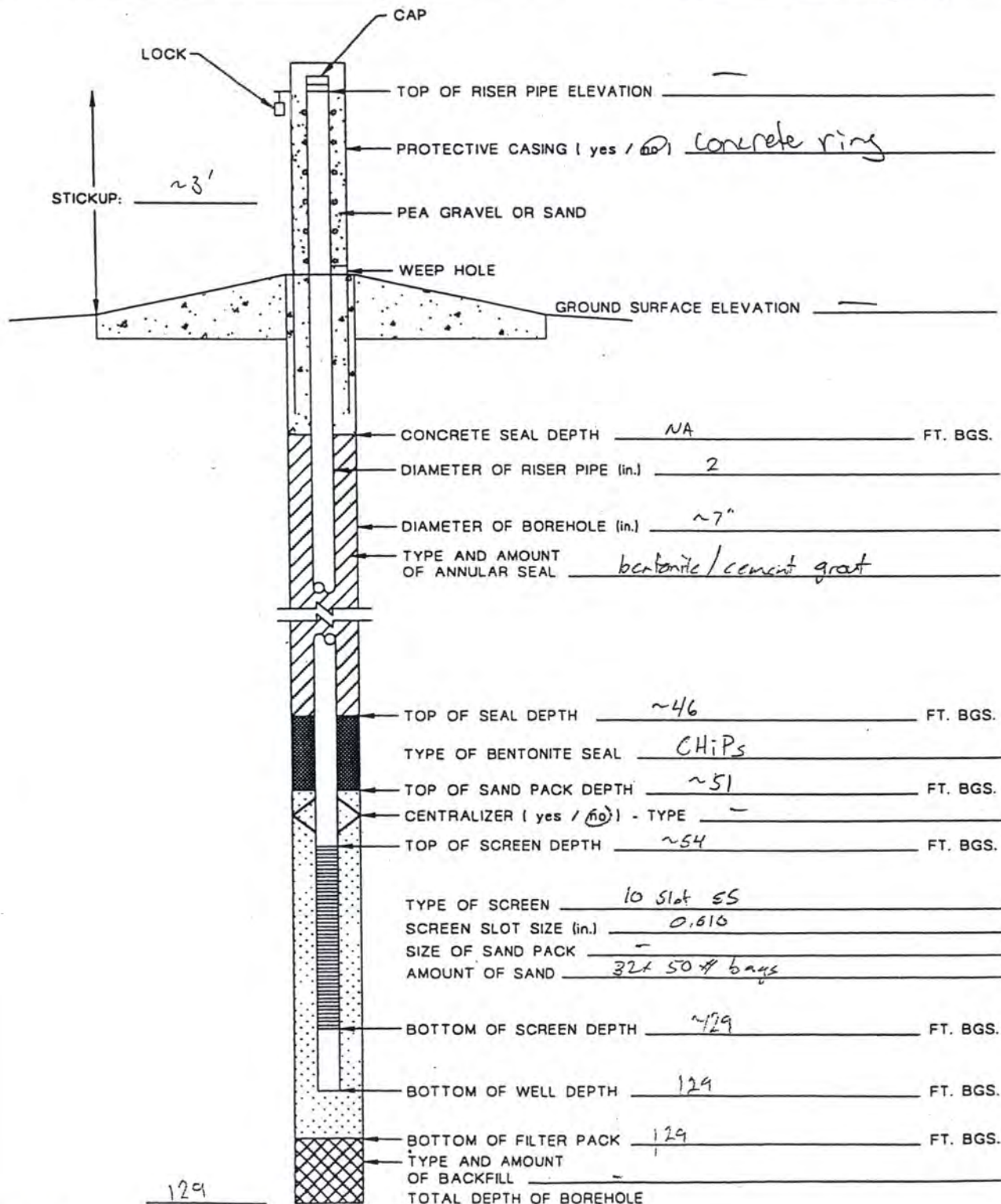
NOTE: DEPTHS MEASURED FROM GROUND SURFACE

**WELL LOGS AND
CONSTRUCTION RECORDS
WATER-LEVEL PIEZOMETER PZ - 2E**



GROUNDWATER MONITORING WELL P2E

SITE NAME: <u>Site P GMS</u>		LOCATION: <u>P2-EAST</u>
CLIENT: <u>Solutia</u>		SURFACE ELEVATION: <u>—</u>
GEOLOGIST: <u>MRF</u>	NORTHING: <u>—</u>	EASTING: <u>—</u>
DRILLER: <u>J CRANK</u>	STATIC WATER LEVEL: <u>—</u>	COMPLETION DATE: <u>6-18-03</u>
DRILLING COMPANY: <u>REDI</u>		DRILLING METHODS: <u>6 3/4" Mud Rotary</u>



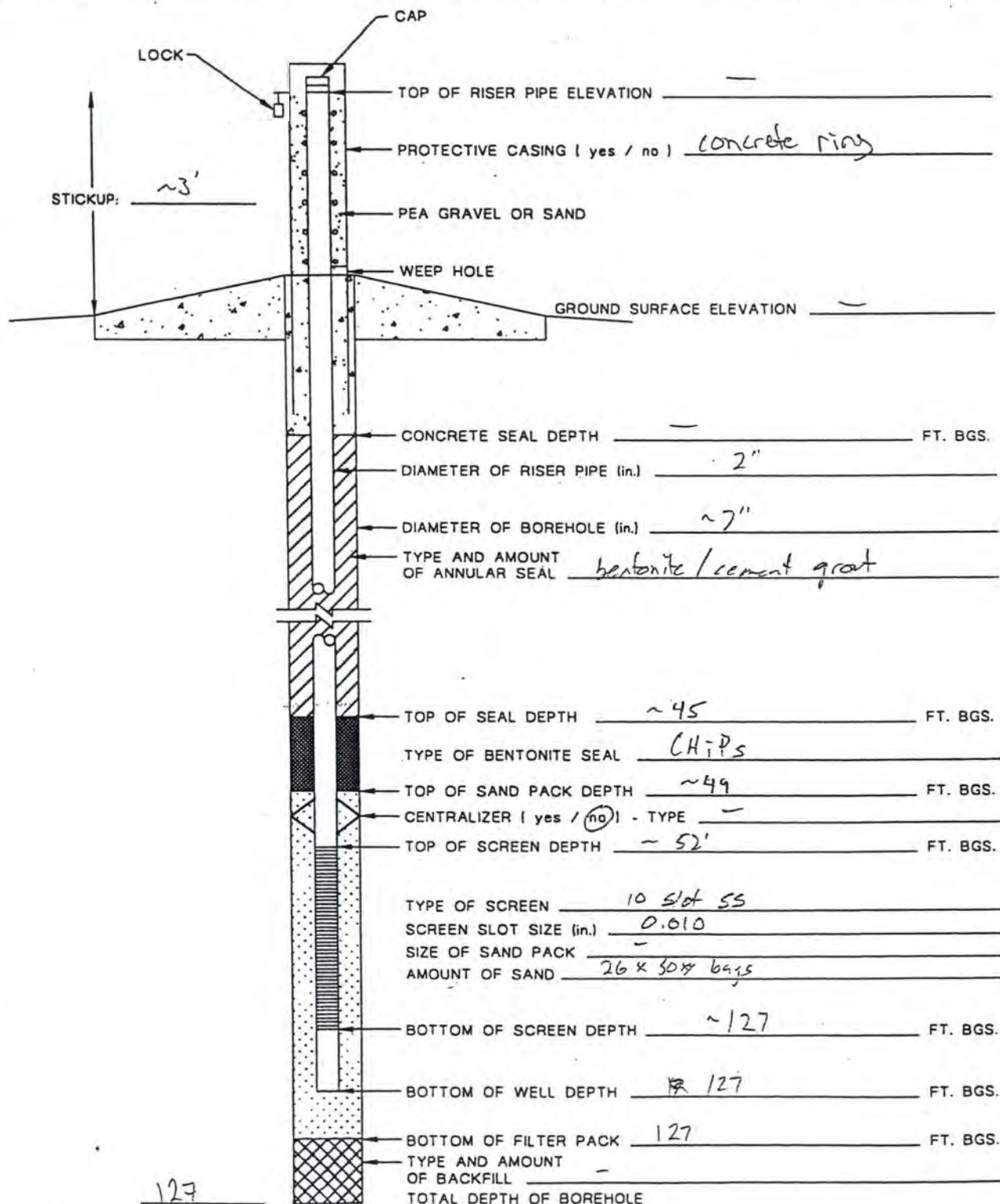
NOTE: DEPTHS MEASURED FROM GROUND SURFACE

**WELL LOGS AND
CONSTRUCTION RECORDS
WATER-LEVEL PIEZOMETER PZ - 2W**



GROUNDWATER MONITORING WELL P2W

SITE NAME: SITE R GMCS LOCATION: P2-west
CLIENT: Solutia SURFACE ELEVATION: —
GEOLOGIST: MRF NORTHING: — EASTING: —
DRILLER: J CRANK STATIC WATER LEVEL: — COMPLETION DATE: 6-16-03
DRILLING COMPANY: Roberts DRILLING METHODS: 6 3/4" Mud Rotary



NOTE: DEPTHS MEASURED FROM GROUND SURFACE

**Golder Associates
Field Boring Log**

DEPTH HOLE <u>128.6' bgs</u>	BOB NO. <u>Area 2</u>	PROJECT <u>GMCS - mwd p2 Installation</u>	BORING NO. <u>P2-6</u>
DEPTH SOIL DRILL <u>128.0' bgs</u>	INSP. <u>MRF</u>	DRILLING METHOD <u>Auger & Mud Rotary</u>	SHEET <u>1</u> OF <u>3</u>
DEPTH ROCK CORE <u>n/a</u>	WEATHER <u>Sunny</u>	DRILLING COMPANY <u>REDI</u>	SURFACE ELEV. <u>-</u>
NO. DIST. SA. <u>28</u>	UD. SA. <u>n/a</u>	DRILL RIG <u>CME 75</u>	DATUM <u>-</u>
TEMP. <u>low 80's</u>	HRS. PROD. <u>-</u>	WT. SAMPLER HAMMER <u>140 lb</u>	DROP <u>Auto</u>
DEPTH WL. <u>19.0' bgs</u>	HRS. DELAYED <u>-</u>	WT. CASING HAMMER <u>n/a</u>	DROP <u>-</u>
TIME WL. <u>945</u>			STARTED <u>8:10</u> / <u>16-12-03</u>
			COMPLETED <u>16:00</u> / <u>16-12-03</u>

SAMPLE TYPES		ABBREVIATIONS		SOIL DESCRIPTION - RANGE OF PROPORTION	
A.S. AUGER SAMPLE	BL BLACK	M MEDIUM	SA SAMPLE	"TRACE" - 0-5%	"SOME" - 12-30%
C.S. CHUNK SAMPLE	BR BROWN	MIC MICACEOUS	SAT SATURATED	"LITTLE" - 5-12%	"AND" - 30-50%
D.D. DRIVE OPEN	C COARSE	MOT MOTTLED	SD SAND		
D.S. DENISON SAMPLE	CA CASING	NP NON-PLASTIC	SI SILT		
P.S. RITCHER SAMPLE	CL CLAY	OG ORANGE	ST SILTY		
R.C. ROCK CORE	CLY CLAYEY	ORG ORGANIC	SOME		
S.T. SLOTTED TUBE	F FINE	PH PRESSURE-HYDRAULIC	TR TRACE		
T.D. THIN-WALLED, OPEN	FRAG FRAGMENTS	PM PRESSURE-MANUAL	WL WATER LEVEL		
T.P. THIN-WALLED, PISTON	GL GRAVEL	R RED	WH WEIGHT OF HAMMER		
W.S. WASH SAMPLE	LYD LAYERED	RES RESIDUAL	Y YELLOW		
	LI LITTLE	ROCK			

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. ATT		
5	(0-?) v. loose, gray and black, GRAVEL and CINDERS, moist (GW, C) (fill)	2 3	1	SS	1,1,2,1	24/24	5	v. Loose gray GRAVEL (GW) & black CINDERS (C) - cold
10	(?-?) loose, brown f SAND, moist (SP) (alluvium)	6 3	2	SS	3,3,2,1	24/24	10	Loose, moist, brown f. grained SAND (SP)
15		6 5	3	SS	3,3,2,3	24/24	15	Same as above
20	H ₂ O @ 19.0' bgs v. soft, brown, SILT, some clay, some f-sand, wet. (ML) (alluvium)	2 2	4	SS	1,1,1,1	24/24	20	v. Soft, wet, brown, clayey, sandy SILT (ML)
25	(?-?) soft to firm gray CLAY, tr to some silt, tr to some f sand, wet. (CL) (alluvium)	4 14	5	SS	2,2,5,9	24/24	25	Soft, wet, grey, sandy, silty CLAY (CL) becomes firm @ 25.0' bgs
30		2 4	6	SS	1,1,2,2	24/24	30	becomes soft
35		4 4	7	SS	2,2,3,1	24/24	35	becomes CLAY (CL) w/ trace silt & fine-grained sand
40		3 5	8	SS	1,2,2,3	24/24	40	Same as above
45	(?-?) firm, gray, SILT, some clay, some f-sand, wet (ML) (alluvium)	6 11	9	SS	3,3,3,8	24/24	45	becomes silty CLAY (CL) w/ trace sand Firm, wet, grey, clayey, sandy SILT (ML)
50	(?-?) compact to dense gray, f-c SAND, tr limestone fragments, tr chert fragments, wet. (SW) (alluvium)	38 28	10	SS	15,23,18,10	18/24	50	Dense, wet, grey, f. to m. grained SAND (SP)
55		15 36	11	SS	6,9,14,22	17/24	55	becomes f. to c. grained

Golder Associates Field Boring Log

DEPTH HOLE <u>128.0</u>	JOB NO. <u>Area 2</u>	PROJECT <u>G-MCS</u>	BORING NO. <u>P2-W</u>
DEPTH SOIL DRILL <u>128.0</u>	GA INSP. <u>MRE</u>	DRILLING METHOD <u>Auger Mud Rotary</u>	SHEET <u>2</u> OF <u>3</u>
DEPTH ROCK CORE <u>-</u>	WEATHER <u>Sunny</u>	DRILLING COMPANY <u>REOI</u>	SURFACE ELEV. <u>-</u>
NO. DIST. SA. <u>23</u> UD. SA. <u>-</u>	TEMP. <u>low 80s</u>	DRILL RIG <u>CME 75</u>	DATUM <u>-</u>
DEPTH WL. <u>19.0' BGS</u>	HRS. PROD. <u>-</u>	WT. SAMPLER HAMMER <u>140</u>	DROP <u>Auto</u>
TIME WL. <u>945</u>	HRS. DELAYED <u>-</u>	WT. CASING HAMMER <u>na</u>	DROP <u>-</u>
			STARTED <u>810</u> / <u>6-12-03</u>
			COMPLETED <u>1600</u> / <u>6-12-03</u>

SAMPLE TYPES		ABBREVIATIONS		SOIL DESCRIPTION - RANGE OF PROPORTION	
A.S. AUGER SAMPLE	BL. BLACK	M. MEDIUM	SA. SAMPLE	"TRACE" - 0-5%	"SOME" - 12-30%
C.S. CHUNK SAMPLE	BR. BROWN	MC. MICACEOUS	SAT. SATURATED	"LITTLE" - 5-12%	"AND" - 30-50%
D.O. DRIVE OPEN	C. COARSE	MOT. MOTTLED	SD. SAND		
D.S. DENISON SAMPLE	CA. CASSING	NP. NON-PLASTIC	SI. SILT		
P.S. RITCHER SAMPLE	CL. CLAY	OG. ORANGE	SIY. SILTY		
R.C. ROCK CORE	CLY. CLAYEY	ORG. ORGANIC	SM. SOME		
S.T. SLOTTED TUBE	F. FINE	PH. PRESSURE-HYDRAULIC	TR. TRACE		
T.O. THIN-WALLED, OPEN	FRAG. FRAGMENTS	PM. PRESSURE-MANUAL	WL. WATER LEVEL		
T.P. THIN-WALLED, PISTON	QL. GRAVEL	R. RED	WH. WEIGHT OF HAMMER		
W.S. WASH SAMPLE	LYD. LAYERED	RES. RESIDUAL	Y. YELLOW		
	U. LITTLE	RX. ROCK			

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. / ATT		
60		43 45	12	SS	20, 23, 24, 24	24 24	60	Same as above
65		35 43	13	SS	15, 20, 21, 22	24 24	65	Same as above
70		26 36	14	SS	15, 11, 16, 20	12 24	70	Same as above - grading coarser
75		26 22	15	SS	13, 13, 11, 11	18 24	75	Same as above - becomes lumpier
80		29 46	16	SS	13, 16, 20, 26	18 24	80	becomes Dense
85		32 46	17	SS	13, 19, 23, 23	18 24	85	becomes m. to c. grained
90		22 19	18	SS	11, 11, 10, 9	12 24	90	w/ LS fragments - becomes lumpier
95		31 41	19	SS	15, 16, 16, 25	12 24	95	w/ chert fragments - becomes Dense
100		36 31	20	SS	18, 18, 18, 13	12 24	100	w/ LS fragments
105		22 22	21	SS	11, 11, 11, 11	12 24	105	Same as above - becomes Compact
110		44 44	22	SS	20, 24, 20, 24	12 24	110	becomes Dense
		64+	23	SS	19, 50 (20)	6 24	115	becomes V. Dense

Golder Associates

Field Boring Log

DEPTH HOLE <u>128</u>	JOB NO. <u>Area 2</u>	PROJECT <u>GMCs</u>	BORING NO. <u>P2-W</u>
DEPTH SOIL DRILL <u>128</u>	GA INSP. <u>MRF</u>	DRILLING METHOD <u>Auger & Mud Rotary</u>	SHEET <u>3</u> OF <u>3</u>
DEPTH ROCK CORE <u>-</u>	WEATHER <u>Sunny</u>	DRILLING COMPANY <u>REDI</u>	SURFACE ELEV. <u>-</u>
NO. DIST. SA. <u>23</u> UD. SA. <u>-</u>	TEMP. <u>low 80s</u>	DRILL RIG <u>CME 75</u>	DRILLER <u>C Habel</u>
DEPTH WL. <u>19.0'</u>	HRS. PROD. <u>-</u>	WT. SAMPLER HAMMER <u>140 #</u>	DROP <u>Auto</u>
TIME WL. <u>945</u>	HRS. DELAYED <u>-</u>	WT. CASING HAMMER <u>-</u>	DROP <u>-</u>
			DATUM <u>-</u>
			STARTED <u>810</u> <u>16-12-03</u>
			COMPLETED <u>1600</u> <u>16-12-03</u>

SAMPLE TYPES		ABBREVIATIONS		SOIL DESCRIPTION - RANGE OF PROPORTION							
A.S.	AUGER SAMPLE	BL	BLACK	M	MEDIUM	SA	SAMPLE	"TRACE"	-0-8%	"SOME"	-12-30%
C.S.	CHUNK SAMPLE	BR	BROWN	MC	MICACEOUS	SAT	SATURATED	"LITTLE"	-8-12%	"AND"	-30-50%
D.D.	DRIVE OPER	C'	COARSE	MP	MOTTLED	SD	SAND				
D.S.	DENISON SAMPLE	CA	CASING	NPT	NON-PLASTIC	SI	SILT				
F.T.	FITCHER SAMPLE	CL	CLAY	OS	ORANGE	SHY	SILTY	RELATIVE DENSITY	BLOWS	CONSISTENCY	FINGER PRESSURE
K.C.	ROCK CORE	CLY	CLAYEY	ORG	ORGANIC	SM	SOME	VERY LOOSE	VLS 0-4	VERY SOFT	VS EXTRUDES
S.T.	SLOTTED TUBE	CFL	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE	LOOSE	LS 4-10	SOFT	S MOLDS EASILY
T.O.	THIN-WALLED, OPEN	FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL	COMPACT	CP 10-30	FIRM	FM MOLDS
T.P.	THIN-WALLED, PISTON	GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER	DENSE	DN 30-60	STIFF	ST THUMB INDENTS
W.S.	WASH SAMPLE	LYD	LAYERED	RES	RESIDUAL	Y	YELLOW	VERY DENSE	VDN 50	VERY STIFF	VST THUMBHALL INDENT
		LI	LITTLE	RK	ROCK					HARD	H RESISTS THUMBHALL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT		
		—	23	SS	19.50 (20)	4/24	118	Same as LS Boulder & cobbles
120	NO recovery, limestone boulders and cobbles.	n/a	24	SS	n/a	n/a	120	Same as above
125		n/a	25	SS	n/a	n/a	125	Same as above
								LS Bedrock
	TORE 128.0' bgs End of Boring							

**WELL LOGS AND
CONSTRUCTION RECORDS
WATER-LEVEL PIEZOMETER PZ - 3E**



GROUNDWATER MONITORING WELL P3E

SITE NAME: SITE R

LOCATION: -

CLIENT: SOLUTIA

SURFACE ELEVATION: -

GEOLOGIST: J. P. 2

NORTHING: -

EASTING: -

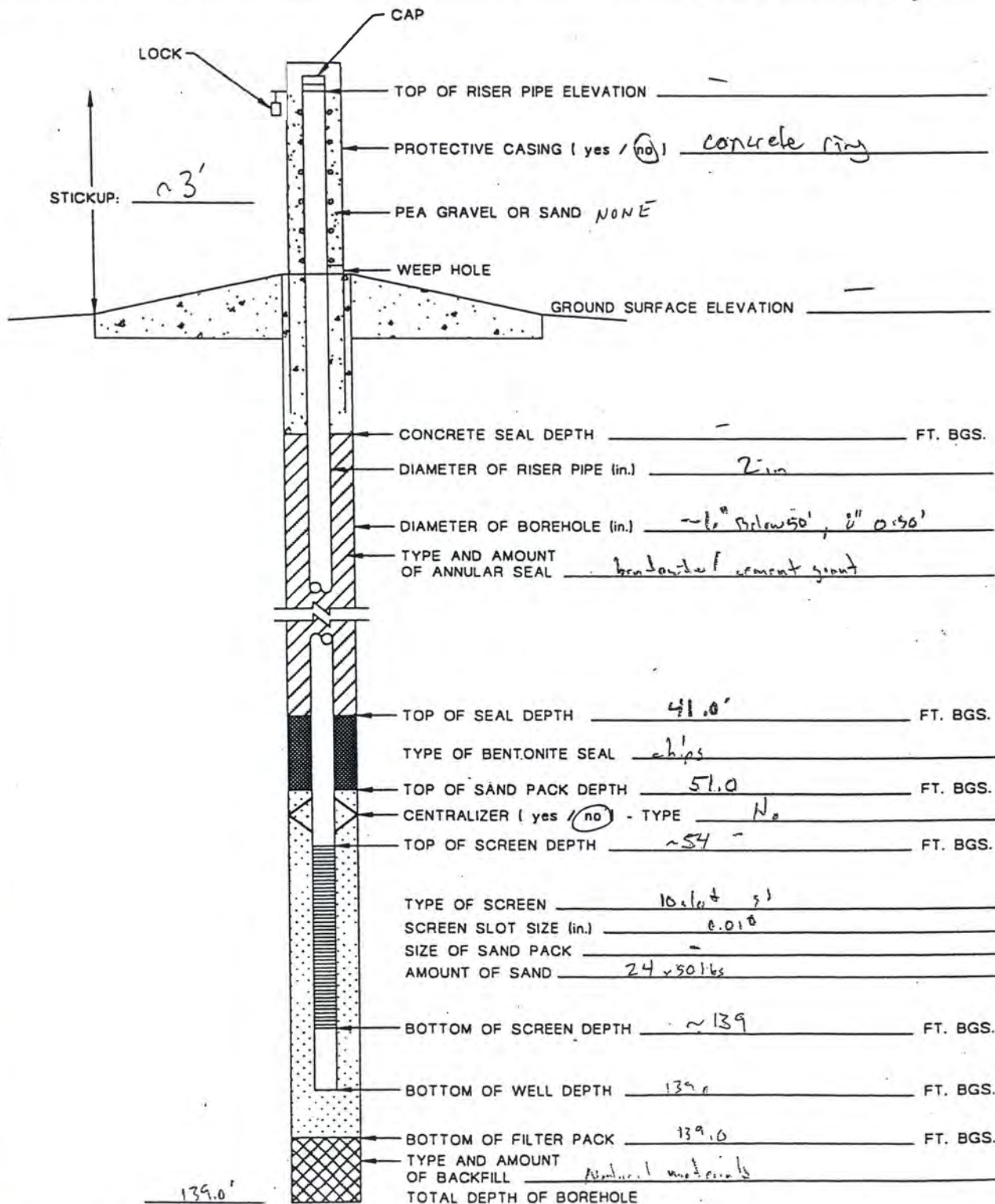
DRILLER: J. C. 2

STATIC WATER LEVEL: -

COMPLETION DATE: 7-8-83

DRILLING COMPANY: REDI

DRILLING METHODS: 5 7/8" Mud Rotary



NOTE: DEPTHS MEASURED FROM GROUND SURFACE

**WELL LOGS AND
CONSTRUCTION RECORDS
WATER-LEVEL PIEZOMETER PZ - 3W**



GROUNDWATER MONITORING WELL P3W

SITE NAME: SITE R

LOCATION: -

CLIENT: SGLUTIA

SURFACE ELEVATION: -

GEOLOGIST: J CLARK

NORTHING: -

EASTING: -

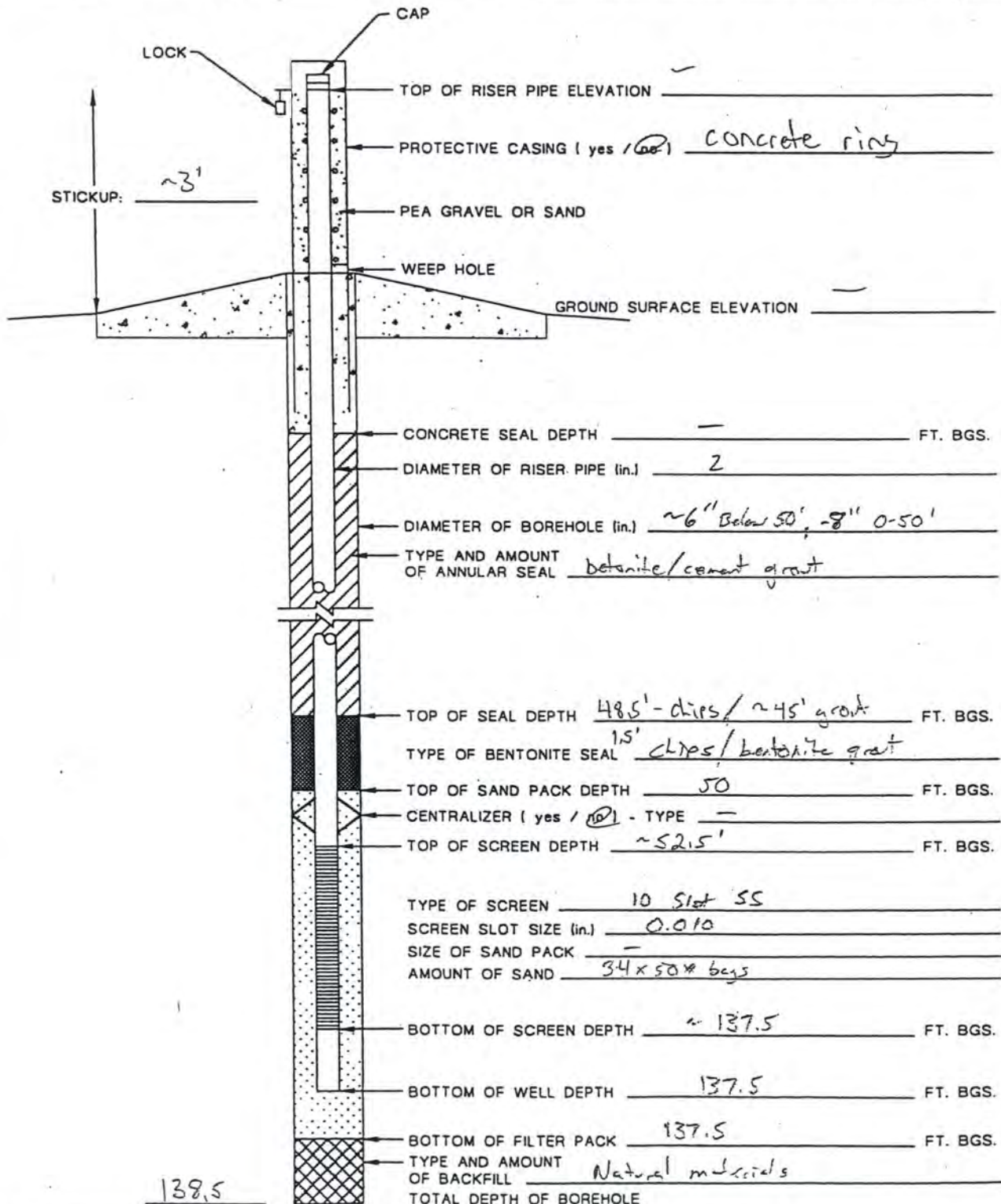
DRILLER: J CRANK

STATIC WATER LEVEL: -

COMPLETION DATE: 7-2-03

DRILLING COMPANY: Roberts

DRILLING METHODS: 5 7/8" Mud Rotary



NOTE: DEPTHS MEASURED FROM GROUND SURFACE

Golder Associates Field Boring Log

DEPTH HOLE <u>128.5</u>	JOB NO. <u>Area 2</u>	PROJECT <u>MW & PZ Installation & Development</u>	BORING NO. <u>P3-W</u>
DEPTH SOIL DRILL <u>128.5</u>	GA INSP. <u>MRF</u>	DRILLING METHOD <u>HSA & Mud Rotary</u>	SHEET <u>1</u> OF <u>3</u>
DEPTH ROCK CORE <u>1 1/2</u>	WEATHER <u>Cloudy</u>	DRILLING COMPANY <u>REDI</u>	SURFACE ELEV. _____
NO. DIST. SA. _____	UD. SAMPL. _____	TEMP. <u>high 70's</u>	DRILL RIG <u>CME 75</u>
DEPTH WL. <u>20.5 ft</u>	HRS. PROD. _____	WT. SAMPLER HAMMER <u>140 lb</u>	DRILLER <u>M. Cooper</u>
TIME WL. <u>1625</u>	HRS. DELAYED _____	WT. CASING HAMMER <u>1 1/2</u>	DROP <u>Auto</u>
			DATUM _____
			STARTED <u>1545</u> <u>6-10-03</u>
			COMPLETED <u>6-11-03</u>

SAMPLE TYPES	ABBREVIATIONS	SOIL DESCRIPTION - RANGE OF PROPORTION
A.S. AUGER SAMPLE C.S. CHUCK SAMPLE D.O. DRIVE OPEN D.S. DENISON SAMPLE P.S. PITCHER SAMPLE R.C. ROCK CORE S.T. SLOTTED TUBE T.O. THIN-WALLED, OPEN T.P. THIN-WALLED, PISTON W.S. WASH SAMPLE	BL BLACK BR BROWN C COARSE CA CASING CL CLAY CLY CLAYEY F FINE FRAG FRAGMENTS GL GRAVEL LYD LAYERED L LITTLE M MEDIUM MIC MICACEOUS MOT MOTTLED NP NON-PLASTIC OG ORANGE ORG ORGANIC PH PRESSURE-HYDRAULIC PM PRESSURE-MANUAL R RED RES RESIDUAL RX ROCK	SA SAMPLE SAT SATURATED SD SAND SI SILT SILTY SILTY SM SOME TR TRACE WL WATER LEVEL WH WEIGHT OF HAMMER Y YELLOW "TRACE" - 0-5% "LITTLE" - 5-12% "SOME" - 12-30% "AND" - 30-50% RELATIVE DENSITY VERY LOOSE VLS 0-4 LOOSE LS 4-10 COMPACT CP 10-30 DENSE DN 30-50 VERY DENSE VDN 50 BLOWS VS 0-10 SOFT 10-30 STIFF 30-50 VERY STIFF 50 HARD CONSISTENCY VS EXTRUDES S MOLDS EASILY FM MOLDS ST THUMB INDENT VST THUMB INDENT H RESISTS THUMBAL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. ATT		
5	(0-?) v. soft to soft brown, CLAYEY SILT, tr to some f sand, moist, (m) (a vacuum)	3	1	SS	1,2,2,1	24/24	5	v. Soft, moist, brown clayey SILT (m) w/ trace f.g. sand becomes gray clayey, sandy SILT (m) @ 4.5 ft bgs
10		3	2	SS	2,1,2,1	24/24	10	Same as above
15		1	3	SS	1,0,1,2	24/24	15	Same as above
20	H ₂ O @ 20.5 ft bgs	3	4	SS	1,2,3,3	24/24	20	Same as above becomes soft, wet @ 20.5 ft bgs
25	(?-?) v. soft, gray, SILTY CLAY, tr f sand, wet. (CL) (alluvium)	3	5	SS	1,2,3,3	24/24	25	v. Soft, wet, gray, silty CLAY (CL) w/ trace f.g. sand
30	(?-?) v. soft, gray, SILT, some clay, some f sand, wet, (m) (alluvium)	3	6	SS	2,1,2,3	24/24	30	v. Soft, wet, gray, clayey, sandy SILT (m)
35	(?-?) compact, gray f-m SAND, wet @ (SP) (alluvium) - becomes v. dense @ 54'	22 28	7	SS	11,1,15,13	24/24	35	compact, wet, gray, f.g. to mgs Same as above SAND (SP)
40	Stop drilling 6-10-03 C 45.0' bgs	12 28	8	SS	6,6,13,18	12/24	40	Same as above
45		36 42	9	SS	16,20,21,21	12/24	45	Same as above becomes dense
50	Resume drilling 6-11-03	36 45	10	SS	17,19,23,22	12/24	50	Same as above
55		41 64	11	SS	16,25,26,38	12/24	55	Same as above becomes v. dense

**Golder Associates
Field Boring Log**

DEPTH HOLE <u>128.5</u>	JOB NO. <u>Area 2</u>	PROJECT <u>MWD & PZ</u>	BORING NO. <u>P3-W</u>
DEPTH SOIL DRILL <u>128.5</u>	GA INSP. <u>MRF</u>	DRILLING METHOD <u>Rotary HSA & Mud Rotary</u>	SHEET <u>2</u> OF <u>3</u>
DEPTH ROCK CORE <u>n/a</u>	WEATHER <u>P. Clayey</u>	DRILLING COMPANY <u>REDI</u>	SURFACE ELEV. _____
NO. DIST. SA. _____	UD. SA. <u>n/a</u>	DRILL RIG <u>CME 75</u>	DRILLER <u>C. Hebel</u>
DEPTH WL. <u>20.5 ft</u>	HRS. PROD. _____	WT. SAMPLER HAMMER <u>140 lb</u>	DATUM _____
TIME WL. <u>1625</u>	HRS. DELAYED _____	WT. CASING HAMMER <u>n/a</u>	DROP _____
			STARTED <u>1545 / 6-10-03</u>
			COMPLETED <u>6-11-03</u>

SAMPLE TYPES	ABBREVIATIONS	SOIL DESCRIPTION - RANGE OF PROPORTION
A.S. AUGER SAMPLE C.S. CHURN SAMPLE D.D. DRIVE OPEN D.S. DENISON SAMPLE F.S. FITCHER SAMPLE R.C. ROCK CORE S.T. SLOTTED TUBE T.O. THIN-WALLED, OPEN T.P. THIN-WALLED, PISTON W.S. WASH SAMPLE	BL BLACK BR BROWN C COARSE CA CASING CL CLAY CLY CLAYEY F FINE FRAG FRAGMENTS GL GRAVEL LTY LAYERED LI LITTLE	M MEDIUM MIC MICACEOUS MOT MOTTLED NP NON-PLASTIC OG ORANGE ONG ORGANIC PH PRESSURE-HYDRAULIC PM PRESSURE-MANUAL R RED RES RESIDUAL RX ROCK

SOIL DESCRIPTION - RANGE OF PROPORTION			
"TRACE" - 0-5% "LITTLE" - 5-12%		"SOME" - 12-30% "AND" - 30-50%	
RELATIVE DENSITY	BLOWS	CONSISTENCY	FINGER PRESSURE
VERY LOOSE VL 0-4	LOOSE LS 4-10	VERY SOFT VS	VS EXTRUDES
COMPACT CP 10-30	DENSE DN 30-50	STIFF ST	ST MOLDS EASILY
VERY DENSE VDN 50		VERY STIFF VST	VST THUMBNAILS WENT
		HARD H	H RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6-IN (FORCE)	REC. ATT		
60		15 12	12	SS	9, 6, 6, 6	0/24	60	No Recovery (NR)
65	(? - ?) compact to v. dense, P-C SAND, multi-colored grains, to gravel, wet (SW) (alluvium)	11 21	13	SS	5, 6, 9, 12	12/24	65	Compact, wet, fig. to c.g. SAND (SP) w/ multi-colored grains & trace gravel
70	- cobbles or boulders @ 82', 110'	26 37	14	SS	13, 13, 14, 23	12/24	70	becomes dense @ 70.5 ft bgs
75	- grades coarser with depth	54 59	15	SS	26, 28, 27, 32	18/24	75	Same as above
80		39 59	16	SS	17, 22, 22, 37	12/24	80	w/ trace chert fragments
85		27 48	17	SS	14, 13, 18, 20	12/24	85	Cobbles and/or Boulders @ 82.0' bgs
90		18 22	18	SS	9, 9, 10, 12	18/24	90	Same as above
95		35 37	19	SS	14, 21, 18, 19	12/24	95	grading coarser, becomes compact
100		32 67	20	SS	16, 16, 37, 30	12/24	100	becomes dense
105		48 58	21	SS	26, 23, 37, 27	12/24	105	becomes m. to G. grained w/ trace fines
110		50+	22	SS	50 (3")	3/24	110	L.S. fragments (Boulder or Cobble)
	(? - ?) firm, gray, CLAY to f-m sand, to silt wet. (CL) (alluvium)	18	23	SS	7, 11, 15, 7	24/24	115	Firm, wet, gray CLAY (CL) w/ trace f. to m. grained sand and trace silt

Field Boring Log

DEPTH HOLE <u>128.5</u>	JOB NO. <u>Area 2</u>	PROJECT <u>MW + PISZO</u>	BORING NO. <u>P3-W</u>
DEPTH SOIL DRILL <u>128.5</u>	GA INSP. <u>MEF</u>	DRILLING METHOD <u>HST + Mud Rotary</u>	SHEET <u>3</u> OF <u>3</u>
DEPTH ROCK CORE <u>-</u>	WEATHER <u>P. Cloudy</u>	DRILLING COMPANY <u>REDI</u>	SURFACE ELEV. <u>-</u>
NO. DIST. SA. <u>-</u> UD. SA. <u>-</u>	TEMP. <u>mid 70s</u>	DRILL RIG <u>CME 75</u>	DATUM <u>-</u>
DEPTH WL. <u>-</u>	HRS. PROD. <u>-</u>	WT. SAMPLER HAMMER <u>140</u>	DROP <u>Auto</u>
TIME WL. <u>-</u>	HRS. DELAYED <u>-</u>	WT. CASING HAMMER <u>-</u>	DROP <u>-</u>
			STARTED <u>1545</u> , <u>6.10.03</u> TIME DATE
			COMPLETED <u>16.11.03</u>

[illegible]

ELEV. DEPTH	DESCRIPTION	BLOWS FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC ATT		
		22	23	SS	7, 11, 15, 7	24/24	115	Same as above
120	(? - ?) v. dense, gray. GRAVEL, some clay, some sand, wet (SP) (alluvium)	21+	24	SS	37, 54 (15)	12/24	120	V. Dense wet, gray, clayey, sandy GRAVEL (GP)
125	(? - 128.5) v. dense gray, m-c SAND, to gravel, wet (SP) (alluvium)	65 SS	25	SS	27, 38, 25, 30	18/24	125	V. Dense, wet, gray, m. to c. grained SAND w/ trace gravel and multi-colored grains
	TOR @ 128.5' bgs							

**WELL LOGS AND
CONSTRUCTION RECORDS
WATER-LEVEL PIEZOMETER PZ - 4E**



GROUNDWATER MONITORING WELL P4E

SITE NAME: SOLUTIA SITE R

LOCATION: Sen

CLIENT: SOLUTIA

SURFACE ELEVATION: -

GEOLOGIST: MRF

NORTHING: -

EASTING: -

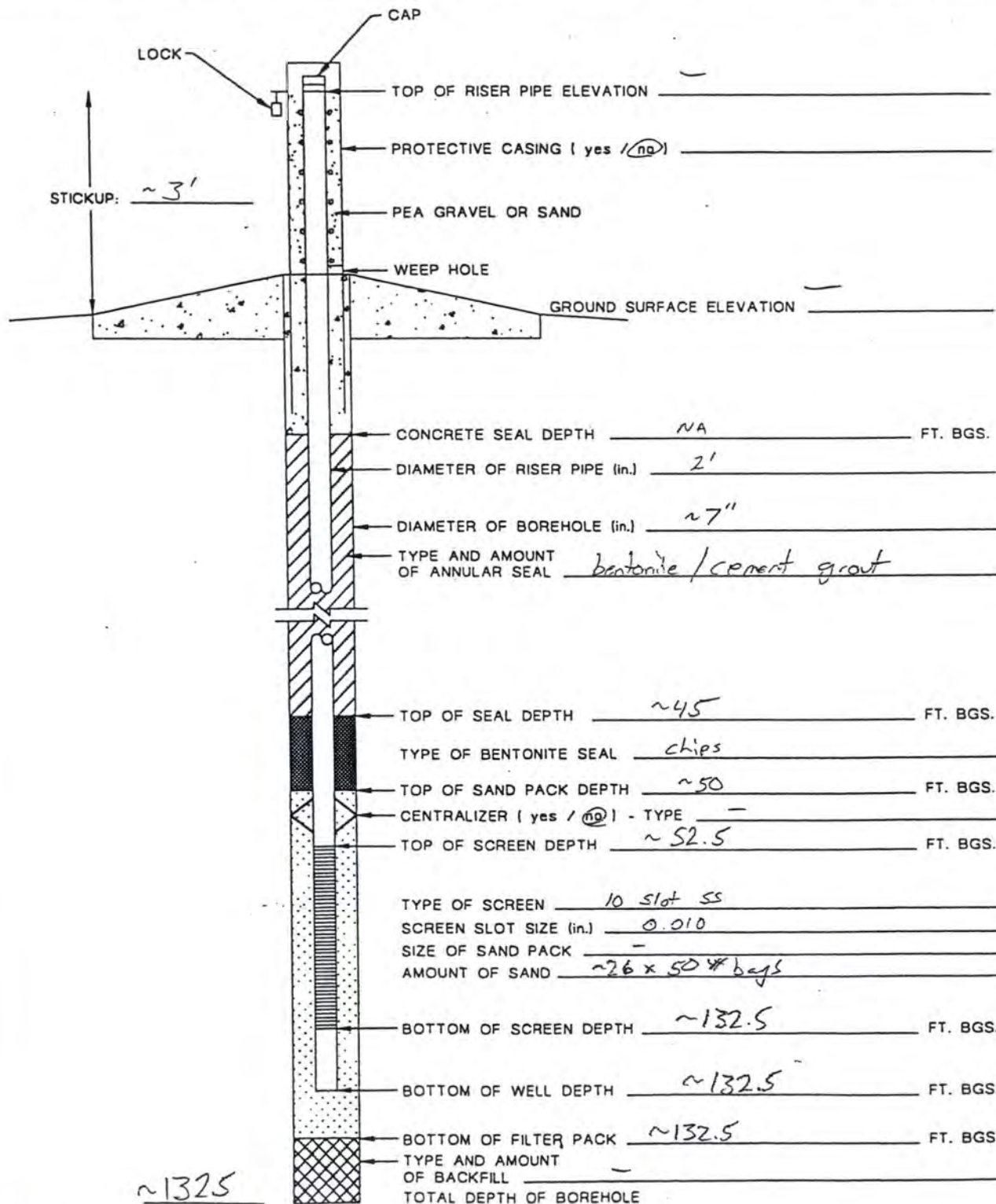
DRILLER: J CRANK

STATIC WATER LEVEL: -

COMPLETION DATE: -

DRILLING COMPANY: Roberts

DRILLING METHODS: 6 3/4" Mud Rotary



NOTE: DEPTHS MEASURED FROM GROUND SURFACE

Golder Associates Field Boring Log

DEPTH HOLE <u>130.5</u>	JOB NO. <u>Area 2</u>	PROJECT <u>MWD PE Installation and Development</u>	BORING NO. <u>24-5</u>
DEPTH SOIL DRILL <u>130.5</u>	GA INSP. <u>MRF</u>	DRILLING METHOD <u>HSA & Mud Rotary</u>	SHEET <u>1</u> OF <u>3</u>
DEPTH ROCK CORE <u>0/1</u>	WEATHER <u>Sunny</u>	DRILLING COMPANY <u>REDI</u>	SURFACE ELEV. <u> </u>
NO. DIST. SA. <u>25</u>	UD. SA. <u>1/4</u>	TEMP. <u>mid 80's</u>	DRILL RIG <u>CME 75</u>
DEPTH WL. <u>24.0' bgs</u>	HRS. PROD. <u> </u>	WT. SAMPLER HAMMER <u>140 lb</u>	DROPPED <u>Auto</u>
TIME WL. <u>1045</u>	HRS. DELAYED <u> </u>	WT. CASING HAMMER <u>0/1</u>	DROPPED <u> </u>
			STARTED <u>950</u> <u>6-9-03</u>
			COMPLETED <u>1110</u> <u>6-10-03</u>

SAMPLE TYPES		ABBREVIATIONS		SOIL DESCRIPTION - RANGE OF PROPORTION	
A.S. AUGER SAMPLE	BL. BLACK	M. MEDIUM	SA. SAMPLE	"TRACE" - 0-5%	"SOME" - 12-30%
C.S. CHUNK SAMPLE	BR. BROWN	MIC. MICACEOUS	SAT. SATURATED	"LITTLE" - 6-12%	"AND" - 30-50%
D.O. DRIVE OPEN	C. COARSE	MOT. MOTTLED	SD. SAND		
D.S. DENSON SAMPLE	CA. CASING	NP. NON-PLASTIC	SI. SILT		
P.S. PITCHER SAMPLE	CL. CLAY	OG. ORANGE	ST. SILTY		
R.C. ROCK CORE	CLY. CLAYEY	ORG. ORGANIC	SM. SOME		
R.T. BOTTLED TUBE	F. FINE	PH. PRESSURE-HYDRAULIC	TR. TRACE		
T.O. THINWALLED, OPEN	FRAG. FRAGMENTS	PM. PRESSURE-MANUAL	WL. WATER LEVEL		
T.P. THINWALLED, PISTON	GL. GRAVEL	R. RED	WH. WEIGHT OF HAMMER		
W.S. WASH SAMPLE	LYD. LAYERED	RES. RESIDUAL	Y. YELLOW		
	U. LITTLE	RX. ROCK			

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. ATT		
5	(0-?) v. soft, brown SILT, tr to some clay, tr to some f sand, moist (ML) (alluvium) - dense s-m sand seam @ 20' - wd @ 24'	1 1/2	1	SS	1, 0, 1, 1	24/24	5	v. soft, moist, brown, clayey SILT (ML) w/ trace f. sand becomes gray sandy SILT (ML) @ 5.0' bgs
10		3 3	2	SS	2, 1, 2, 1	24/24	10	Same as above
15		3 2	3	SS	1, 2, 1, 1	24/24	15	Same as above
20		15 37	4	SS	5, 10, 16, 21	18/24	20	M. dense, moist, lt. grey SAND (SP) - fine to m. grained w/ multi-colored grains becomes dense @ 20.5 ft bgs
25	▽ H ₂ O @ 24.0' bgs	3 3	5	SS	2, 1, 2, 1	24/24	25	Soft, moist, grey sandy SILT (ML)
30		5 4	6	SS	2, 3, 2, 2	24/24	30	becomes sandy, clayey, SILT (ML)
35	(?-20) soft, gray, CLAY, some sand, some silty wd, (CL) (alluvium)	2 4	7	SS	1, 1, 2, 2	24/24	35	becomes sandy, silty, CLAY (CL)
40	(40-?) dense to v dense gray, f-c SAND, wet, (SP) (alluvium)	15 39	8	SS	5, 10, 18, 21	18/24	40	Same as above Dense, moist, grey, f. to m. grained SAND (SP) w/ multi-colored grains
45		25 32	9	SS	12, 13, 17, 18	12/24	45	Same as above
50		13 33	10	SS	5, 8, 15, 18	12/24	50	now becomes f. to c. grained SAND (SP)
55		23 37	11	SS	8, 15, 17, 20	12/24	55	Same as above

Golder Associates Field Boring Log

DEPTH HOLE <u>136.5</u>	JOB NO. <u>Area 2</u>	PROJECT <u>MW & PE Installation & Development</u>	BORING NO. <u>P4-8</u>
DEPTH SOIL DRILL <u>30.5</u>	QA INSP. <u>MRF</u>	DRILLING METHOD <u>HSA & Mud Rotary</u>	SHEET <u>2</u> OF <u>3</u>
DEPTH ROCK CORE <u>n/a</u>	WEATHER <u>Sunny</u>	DRILLING COMPANY <u>REDI</u>	SURFACE ELEV. <u> </u>
NO. DIST. SA. <u>25</u>	UD. SA. <u>n/a</u>	TEMP. <u>mid 80's</u>	DRILL RIG <u>CME TS</u>
DRILLER <u>M. Cooper</u>	DATUM <u> </u>	WT. SAMPLER HAMMER <u>140 lb</u>	DROP <u>Auto</u>
DEPTH WL. <u>24.0' bgs</u>	HRS. PROD. <u> </u>	WT. CASING HAMMER <u>n/a</u>	DROP <u> </u>
TIME WL. <u>1045</u>	HRS. DELAYED <u> </u>	COMPLETED <u>1410</u>	DATE <u>6-9-03</u>

SAMPLE TYPES	ABBREVIATIONS	SOIL DESCRIPTION - RANGE OF PROPORTION
A.S. AUGER SAMPLE C.S. CHURN SAMPLE D.O. DRIVE OPEN D.S. DENISON SAMPLE P.S. PITCHER SAMPLE R.C. ROCK CORE S.T. SLOTTED TUBE T.O. THIN-WALLED, OPEN T.P. THIN-WALLED, PISTON W.S. WASH SAMPLE	BL BLACK BR BROWN C COARSE CA CASING CL CLAY CLY CLAYEY F FINE FRAG FRAGMENTS GL GRAVEL LYD LAYERED L LITTLE	M MEDIUM MIC MICACEOUS MOT MOTTLED NP NON-PLASTIC OR ORANGE ORG ORGANIC PH PRESSURE-HYDRAULIC PM PRESSURE-MANUAL R RED RES RESIDUAL RX ROCK

SOIL DESCRIPTION - RANGE OF PROPORTION			
"TRACE" - 0-5% "LITTLE" - 5-12% "SOME" - 12-30% "AND" - 30-50%			
RELATIVE DENSITY	BLOWS	CONSISTENCY	FINGER PRESSURE
VERY LOOSE VLS 0-4	VERY SOFT VS 0-10	VS EXTRUDES	
LOOSE LS 4-10	SOFT SF 10-30	S MOLDS EASILY	
COMPACT CP 10-30	FIRM FM 30-50	ST MOLDS	
DENSE DM 30-50	STIFF ST 50-100	ST THUMB INDENTS	
VERY DENSE VDM 50-100	HARD H 100-200	VST THUMB INDENTS	
		H RESISTS THUMB IND.	

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES				SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HAMM. BLOWS PER 6 IN. (FORCE)	REC. ATT	
60		26 66	12	SS	9, 17, 29, 37	24/24	Same as above becomes V. Dense @ 60.0 ft bgs
65		18 22	13	SS	11, 17, 15	18/24	becomes M. Dense @ 64.0 ft bgs
70		41 55	14	SS	19, 22, 39, 25	24/24	becomes V. Dense @ 70.0 ft bgs
75		37 69	15	SS	14, 23, 27, 40	24/24	Same as above
80		58 43	16	SS	28, 30, 18, 25	18/24	becomes Dense @ 80.0 ft bgs w/ trace chert fragments
85		34 39	17	SS	18, 16, 19, 20	12/24	Same as above
90	(? - 130.5) Dense, gray m-c SAND, little fines, tr chert fragments, 60' (alluvial) - little gravel @ 107' - little clay @ 115'	22 40	18	SS	9, 13, 22, 18	18/24	w/ little m. to c. - grained w/ little fines
95		22 30	19	SS	5, 14, 14, 16	18/24	w/ trace chert fragments
100	Stop Drilling 6-9-03	51 73	20	SS	23, 29, 36, 37	18/24	w/o chert fragments
105	Resume Drilling 6-10-03	40 56	21	SS	17, 23, 25, 31	18/24	w/ trace chert fragments
		64	22	SS	60 + 64	2/24	Same as above w/ little gravel
110		48	23	SS	23, 26, 29, 13	18/24	Same as above w/ little gray CLAY (CL)

**Golder Associates
Field Boring Log**

DEPTH HOLE <u>130.5</u>	JOB NO. <u>Area 2</u>	PROJECT <u>MW & PZ Installation & Development</u>	BORING NO. <u>P4-E</u>
DEPTH SOIL DRILL <u>120.5</u>	GA INSP. <u>MRF</u>	DRILLING METHOD <u>ASA & Mud Rotary</u>	SHEET <u>3</u> OF <u>3</u>
DEPTH ROCK CORE <u>n/a</u>	WEATHER <u>Rainy</u>	DRILLING COMPANY <u>REDI</u>	SURFACE ELEV. _____
NO. DIST. SA. <u>25</u>	UD. SA. <u>n/a</u>	DRILL RIG <u>CMR 75</u>	DRILLER <u>M. Cooper</u>
TEMP. <u>MW 60's</u>			DATUM _____
DEPTH WL. <u>24.0' bys</u>	HRS. PROD. <u>-</u>	WT. SAMPLER HAMMER <u>140 lb</u>	DROP <u>Auto</u>
TIME WL. <u>1045</u>	HRS. DELAYED <u>-</u>	WT. CASING HAMMER <u>n/a</u>	DROP <u>-</u>
			STARTED <u>750</u> / <u>6.9.03</u>
			COMPLETED <u>1410</u> / <u>6.10.03</u>

SAMPLE TYPES			ABBREVIATIONS			SOIL DESCRIPTION - RANGE OF PROPORTION							
A.S.	AUGER SAMPLE	BL	BLACK	M	MEDIUM	SA	SAMPLE	"TRACE" - 0 - 5%		"SOME" - 12 - 30%			
C.S.	CHUNK SAMPLE	BR	BROWN	MIC	MICACEOUS	SAT	SATURATED	"LITTLE" - 5 - 12%		"AND" - 30 - 50%			
D.O.	DRIVE OPEN	C	COARSE	MOT	MOTTLED	SD	SAND						
D.S.	DENSON SAMPLE	CA	CASING	NP	NON-PLASTIC	SI	SILT						
P.S.	PITCHER SAMPLE	CL	CLAY	OG	ORANGE	SIY	SILTY	RELATIVE DENSITY	BLOWS	CONSISTENCY	FINGER PRESSURE		
R.C.	ROCK CORE	CLY	CLAYEY	ORG	ORGANIC	SM	SOME	VERY LOOSE	VL 0 4	VERY SOFT	VS	EXTRUDES	
S.T.	SLOTTED TUBE	F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE	LOOSE	LS 4 10	SOFT	S	MOLDS EASILY	
T.O.	THIN-WALLED, OPEN	FR	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL	COMPACT	CP 10-30	FIRM	FM	MOLDS	
T.P.	THIN-WALLED, PISTON	GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER	DENSE	DH 30-50	STIFF	ST	THINLY INDENTS	
W.S.	WASH SAMPLE	LYD	LAYERED	RES	RESIDUAL	Y	YELLOW	VERY DENSE	VDN 50	VERY STIFF	VS	THUMBNAIL, INDENT	
		LI	LITTLE	RX	ROCK					HARD	H	RESISTS THUMBNAIL	

ELEV. DEPTH	DESCRIPTION	BLOWS FT	SAMPLES				DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
			NO.	TYPE	HMM. BLOWS PER 6 IN. (FORCE)	REC. ATT		
		39	23	SS	23, 26, 29, 31	18/24	115	SAME AS ABOVE
120		37 42	24	SS	16, 21, 24, 24	12/24	120	SAME AS ABOVE grading to coarser grains
125		51 76	25	SS	22, 29, 39, 37	18/24	125	BECOMES V. DENSE
130							130	
	TOR 130.5' ₄₅							

**WELL LOGS AND
CONSTRUCTION RECORDS
WATER-LEVEL PIEZOMETER PZ - 4W**



GROUNDWATER MONITORING WELL P4W

SITE NAME: Solutia Site R

LOCATION: S end & Site

CLIENT: Solutia

SURFACE ELEVATION: -

GEOLOGIST: MRF

NORTHING: -

EASTING: -

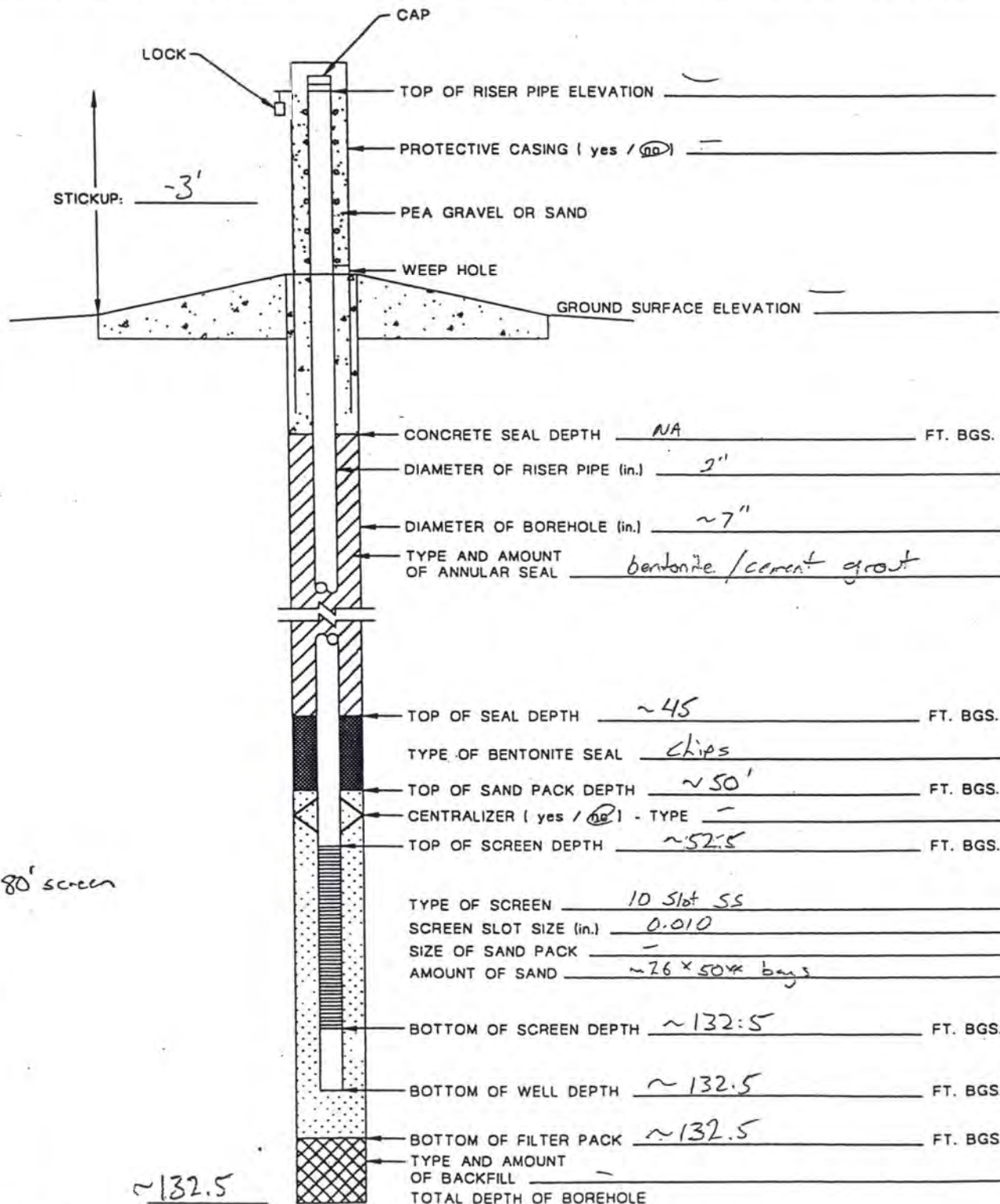
DRILLER: J CRANK

STATIC WATER LEVEL: -

COMPLETION DATE: -

DRILLING COMPANY: REDI

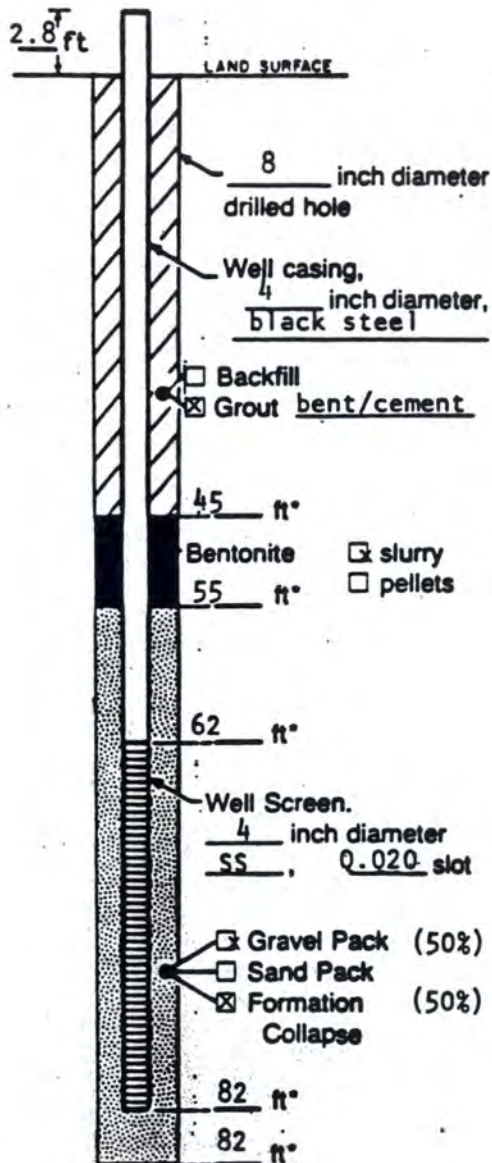
DRILLING METHODS: 6 3/4" Mud Rotary



NOTE: DEPTHS MEASURED FROM GROUND SURFACE

**WELL LOGS AND
CONSTRUCTION RECORDS
EXISTING MONITORING WELL GM - 27B**

WELL CONSTRUCTION LOG



Measuring Point is Top of
Well Casing Unless Otherwise
Noted.

*Depth Below
Land Surface

Project Monsanto Company Well GM-27B

Town/City Sauget

County St. Clair State IL

Permit No. _____

Land-Surface Elevation _____

and Datum _____ feet ☒ surveyed

Measuring Point 426.04 Ft (MSL) ☐ estimated

Installation Date(s) 8/6/84

Drilling Method Mud Rotary

Drilling Contractor John Mathes & Associates, Inc.

Drilling Fluid Bentonite

Development Technique(s) and Date(s)
surged with compressed air

Fluid Loss During Drilling _____ gallons

Water Removed During Development 1200 gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration 2 hours

Yield 10 gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose ground-water monitoring well

Remarks _____

Prepared by D. Colton

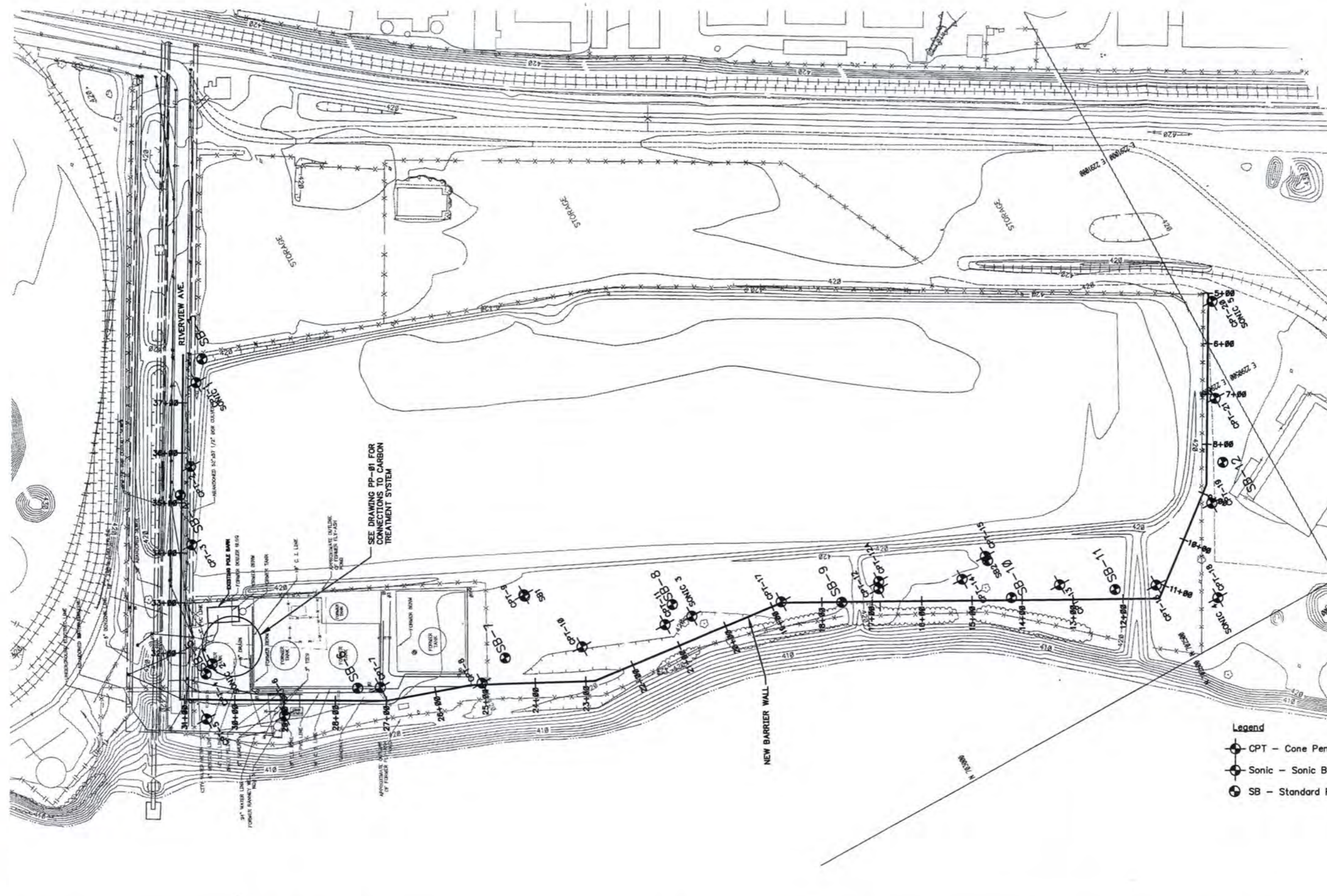
<u>Description</u>	<u>Depth (feet)</u>
<u>Wells GM-16AB</u>	
Silt, sandy, brown	1 - 6
Sand, very fine to fine, very silty, brown	6 - 29
Sand, fine, gray; some silt	29 - 40
Sand, fine, gray	40 - 50
Sand, fine to medium, gray; some gravel	50 - 70
Sand, fine to coarse, gray; with gravel	70 - 90
<u>Wells GM-17ABC</u>	
Sand, very fine, silty, brown	0 - 4
Clay, gray; some silt and fine sand	4 - 11
Sand, very fine, tan; some silt	11 - 23
Sand, very fine, brown; trace of medium sand and silt	23 - 50
Sand, fine to medium, gray; some fine gravel	50 - 70
Sand, fine to coarse, gray; with fine to medium gravel	70 - 107
<u>Wells GM-18AB</u>	
Silt, clayey, brown; trace of fine sand and gravel	0 - 6
Sand, fine, grayish-brown; some silt	6 - 38
Sand, fine, grayish-brown	38 - 50
Sand, fine to medium, grayish-brown; some fine gravel and coal fragments	50 - 80
Sand, fine to coarse, gray; with fine to medium gravel	80 - 92
<u>Wells GM-25AB</u>	
Sand, very fine, silty, brown	0 - 14
Sand, fine, brown; some silt	14 - 33
Sand, fine, gray	33 - 50
Sand, fine to medium, gray; some silt and coarse sand	50 - 70
Sand, fine to coarse, gray; some fine to medium gravel	70 - 88
<u>Wells GM-27BC</u>	
Sand, fine, silty; brown and black	0 - 13
Silt, sandy, gray; some fine sand	13 - 22
Sand, fine, gray; some silt	22 - 33
Clay, silty, gray; some fine sand	33 - 36
Sand, fine, silty, gray	36 - 48
Sand, fine to medium, gray; little silt	48 - 75
Sand, fine to coarse, gray; some fine to medium gravel	75 - 105

GEOLOGIC SECTIONS
URS BARRIER WALL ALIGNMENT PROFILE
JULY 2003

NOTE:

EXISTING SURFACE FEATURES HAVE BEEN PLOTTED FROM AN AERIAL SURVEY BY SURDEX. THE LOCATIONS OF UNDERGROUND UTILITIES, STRUCTURES AND FACILITIES HAVE BEEN PLOTTED FROM PLANS AND DRAWINGS OF EXISTING FACILITIES PROVIDED BY Solutia. THEIR LOCATIONS MUST BE CONSIDERED APPROXIMATE ONLY. THERE MAY BE OTHER IMPROVEMENTS AND UTILITIES WITHIN THE PROJECT AREA, WHICH ARE NOT SHOWN. THE CONTRACTOR SHALL VERIFY, PRIOR TO EXCAVATION OR CONSTRUCTION, THE LOCATIONS, ELEVATIONS AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES, WELLS AND OTHER FEATURES AFFECTING HIS WORK, WHETHER OR NOT SHOWN ON THE PLANS. USE OF A SUBSURFACE LOCATOR IS RECOMMENDED.

SHOULD ANY FEATURE ADVERSELY AFFECT THE PROPOSED CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN Solutia's APPROVAL FOR A CHANGE OR MODIFICATION TO THESE PLANS PRIOR TO PROCEEDING.



Legend

- CPT - Cone Penetrometer Location (2001)
- Sonic - Sonic Boring Location (2002)
- SB - Standard Penetration Test Boring (2001 AND 2002)



FILE: E:\21561192\00001\ENH.DWG 7-3-03 SHEET 2-05 BOUNDARY Laid out: AUG. 19. 03 9:29:58 am by: D:\DREW

NO.	DATE	REVISION DESCRIPTION	APPROVED

PREPARED BY:

URS

1001 Highlands Plaza Dr. West, Suite 300
St. Louis, MO 63110
Tel: 314-429-0100
fax: 314-429-0462

SEAL

DATE: 7/3/03
SCALE: AS SHOWN
DESIGNED: KMB
DRAWN: DJD/WDL
CHECKED: KMB
SUBMITTED:



Solutia INC.
575 MARYVILLE CENTRE DRIVE
ST. LOUIS, MO. 63141

GROUNDWATER MIGRATION CONTROL SYSTEM

PACKAGE 2 - BARRIER WALL

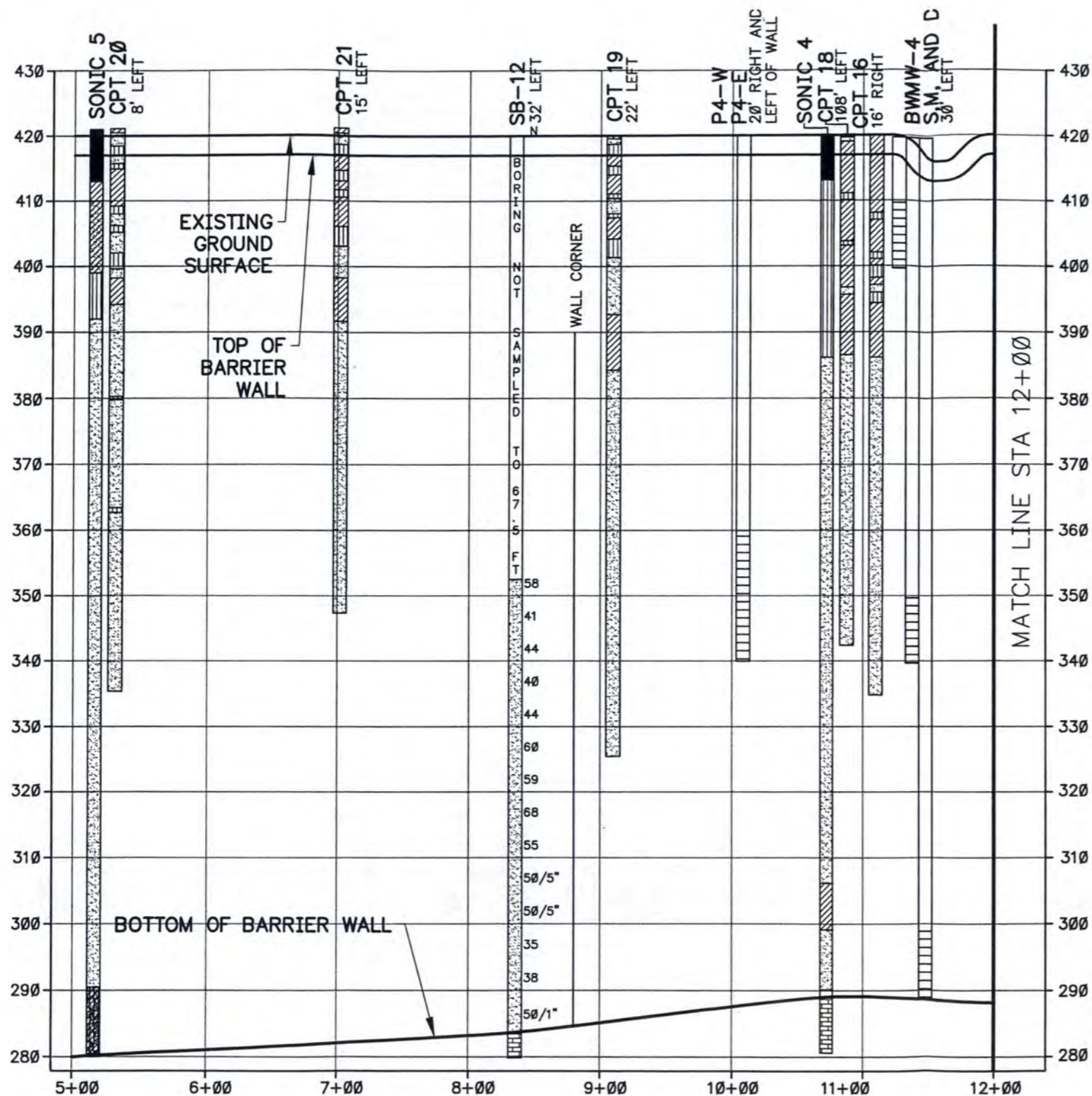
BORING LOCATION PLAN

PROJECT NO.

21561192.00001

SHEET NO.

2-05



LEGEND

- CLAY (CL OR CH)
- SILT (ML)
- CLAYEY SAND (SC)
- SAND (SP OR SW)
- GRAVEL AND/OR COBBLES
- LIMESTONE
- PROPOSED SCREENED INTERVAL OF EXTRACTION WELL OR PIEZOMETER
- 10+00 WALL STATION AT CENTERLINE OF BARRIER WALL
- CPT-1 CONE PENETROMETER TEST NUMBER (2001)
- SONIC 1 SONIC BORING NUMBER (2002)
- SB-1 SOIL BORING NUMBER (2002)
- 62 STANDARD PENETRATION TEST BLOW COUNT (N). BLOWS /12" PENETRATION OF SAMPLER UNLESS INDICATED OTHERWISE
- P HYDRAULICALLY PUSHED SAMPLE

NOTES:

- 1) THESE GRAPHIC LOGS DEPICT GENERALIZED SOIL CONDITIONS. REFER TO INDIVIDUAL LOGS FOR DETAILS.
- 2) TOP AND BOTTOM OF BARRIER WALL AS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS ARE SUBJECT TO CHANGE DUE TO DESIGN AND CONSTRUCTION ISSUES.

FILE: E:\1581192\00001\FINAL DESIGN 7-3-03\THRU 2-12.DWG Last edited: JUL 02 03 @ 1:08 p.m. by: DUDGUD00

NO.	DATE	REVISION DESCRIPTION	APPROVED

PREPARED BY:

URS

1001 Highlands Plaza Dr. West, Suite 300
St. Louis, MO 63110
Tel: 314-429-0100
fax: 314-429-0462

DATE: 7/3/03
SCALE: AS SHOWN
DESIGNED: KMB
DRAWN: DJD/WDL
CHECKED: KMB
SUBMITTED:



SOLUTIA INC.
575 MARYVILLE CENTRE DRIVE
ST. LOUIS, MO. 63141

GROUNDWATER MIGRATION CONTROL SYSTEM

PACKAGE 2 - BARRIER WALL

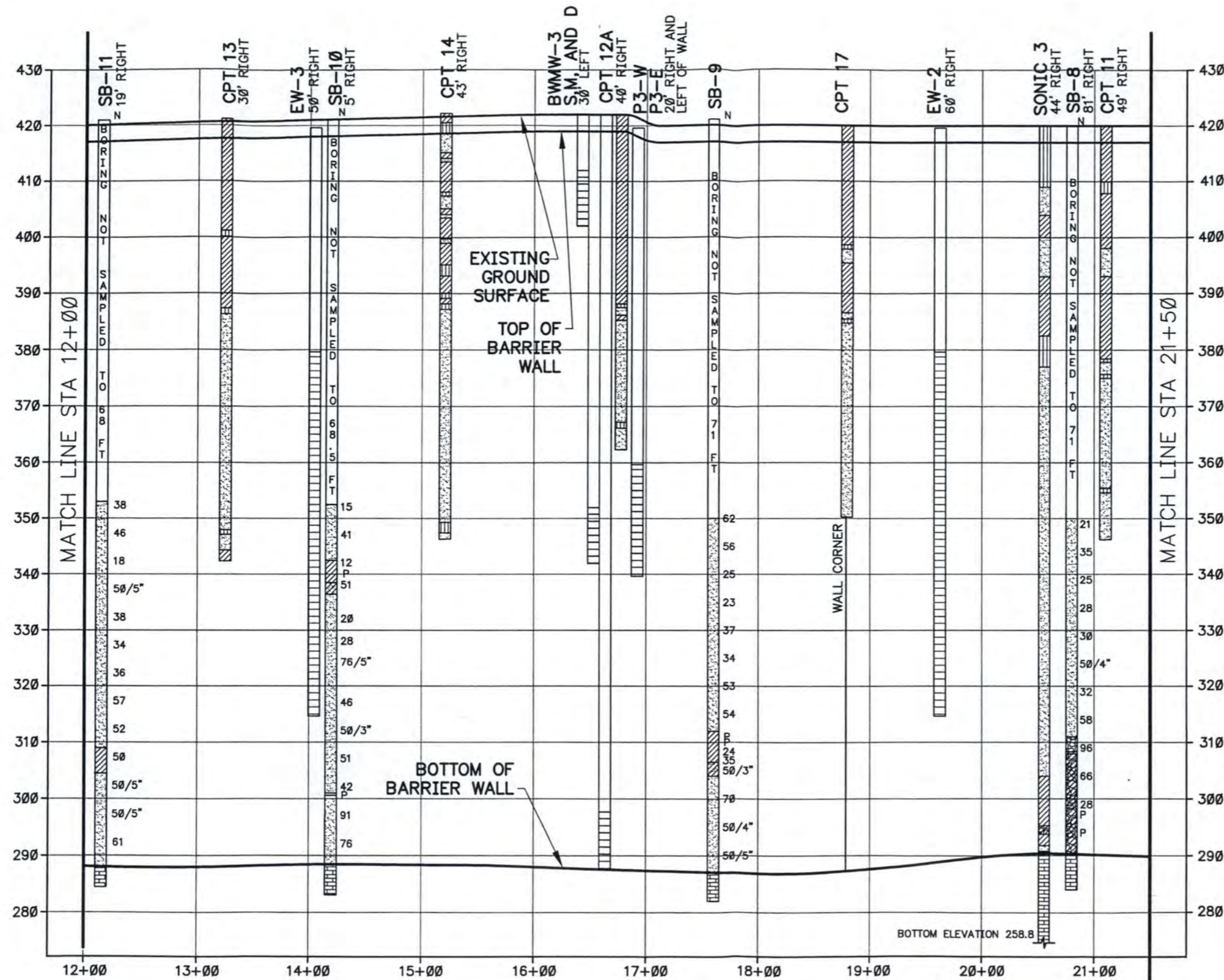
BARRIER WALL - PROFILE
STA 5+00 TO 12+00

URS PROJECT NO.

21561192.00001

SHEET NO.

2-09

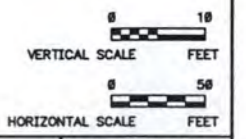


LEGEND

- CLAY (CL OR CH)
- SILT (ML)
- CLAYEY SAND (SC)
- SAND (SP OR SW)
- GRAVEL AND/OR COBBLES
- LIMESTONE
- PROPOSED SCREENED INTERVAL OF EXTRACTION WELL OR PIEZOMETER
- 10+00 WALL STATION AT CENTERLINE OF BARRIER WALL
- CPT-1 CONE PENETROMETER TEST NUMBER (2001)
- SONIC 1 SONIC BORING NUMBER (2002)
- SB-1 SOIL BORING NUMBER (2002)
- 62 STANDARD PENETRATION TEST BLOW COUNT (N). BLOWS /12" PENETRATION OF SAMPLER UNLESS INDICATED OTHERWISE
- P HYDRAULICALLY PUSHED SAMPLE

NOTES:

- THESE GRAPHIC LOGS DEPICT GENERALIZED SOIL CONDITIONS. REFER TO INDIVIDUAL LOGS FOR DETAILS.
- TOP AND BOTTOM OF BARRIER WALL AS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS ARE SUBJECT TO CHANGE DUE TO DESIGN AND CONSTRUCTION ISSUES.



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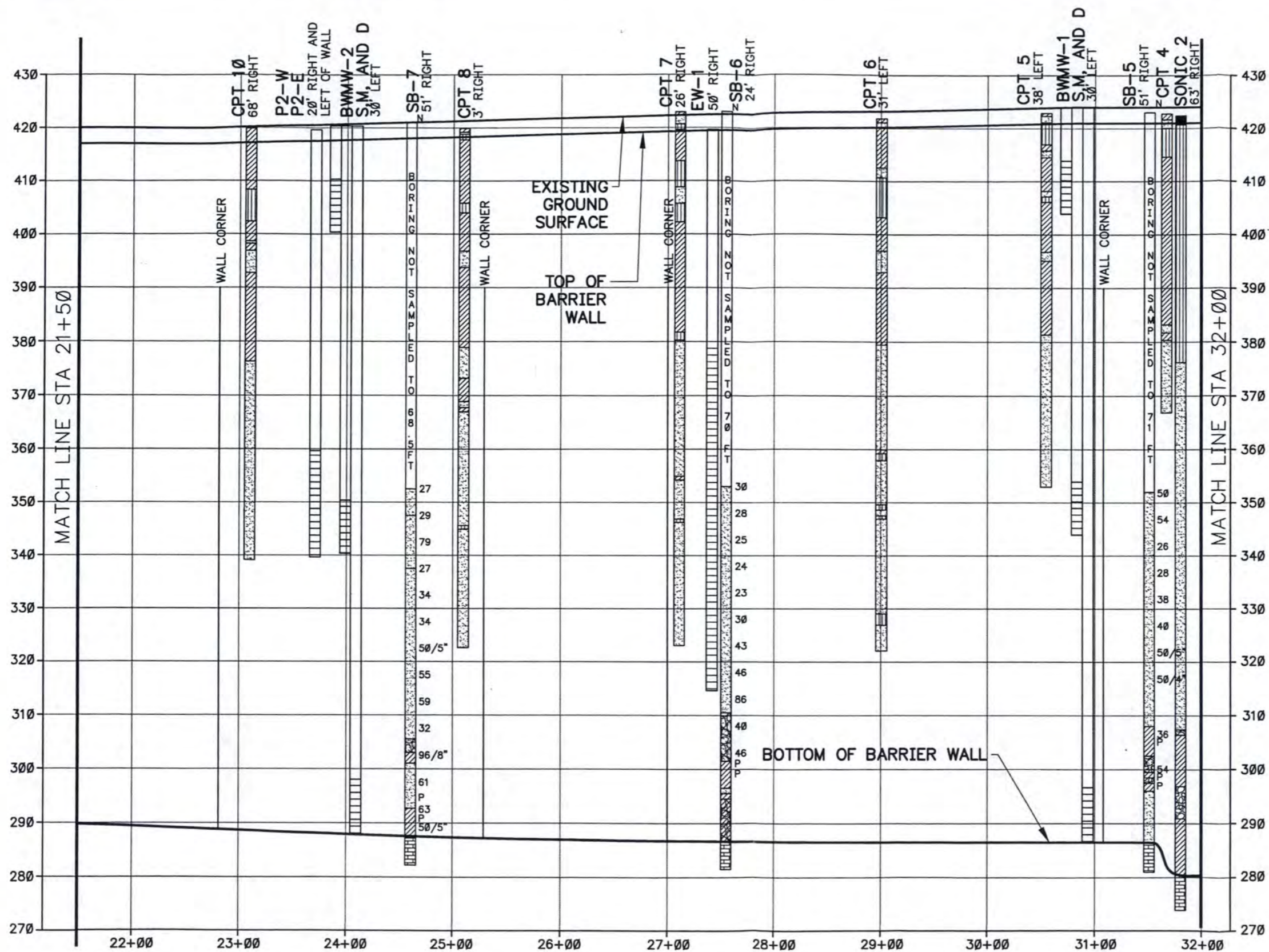
PREPARED BY:
URS
 1001 Highlands Plaza Dr. West, Suite 300
 St. Louis, MO 63110
 Tel: 314-429-0100
 fax: 314-429-0462

DATE: 7/9/03
SCALE: AS SHOWN
DESIGNED: KMB
DRAWN: DJD/WDL
CHECKED: KMB
SUBMITTED:

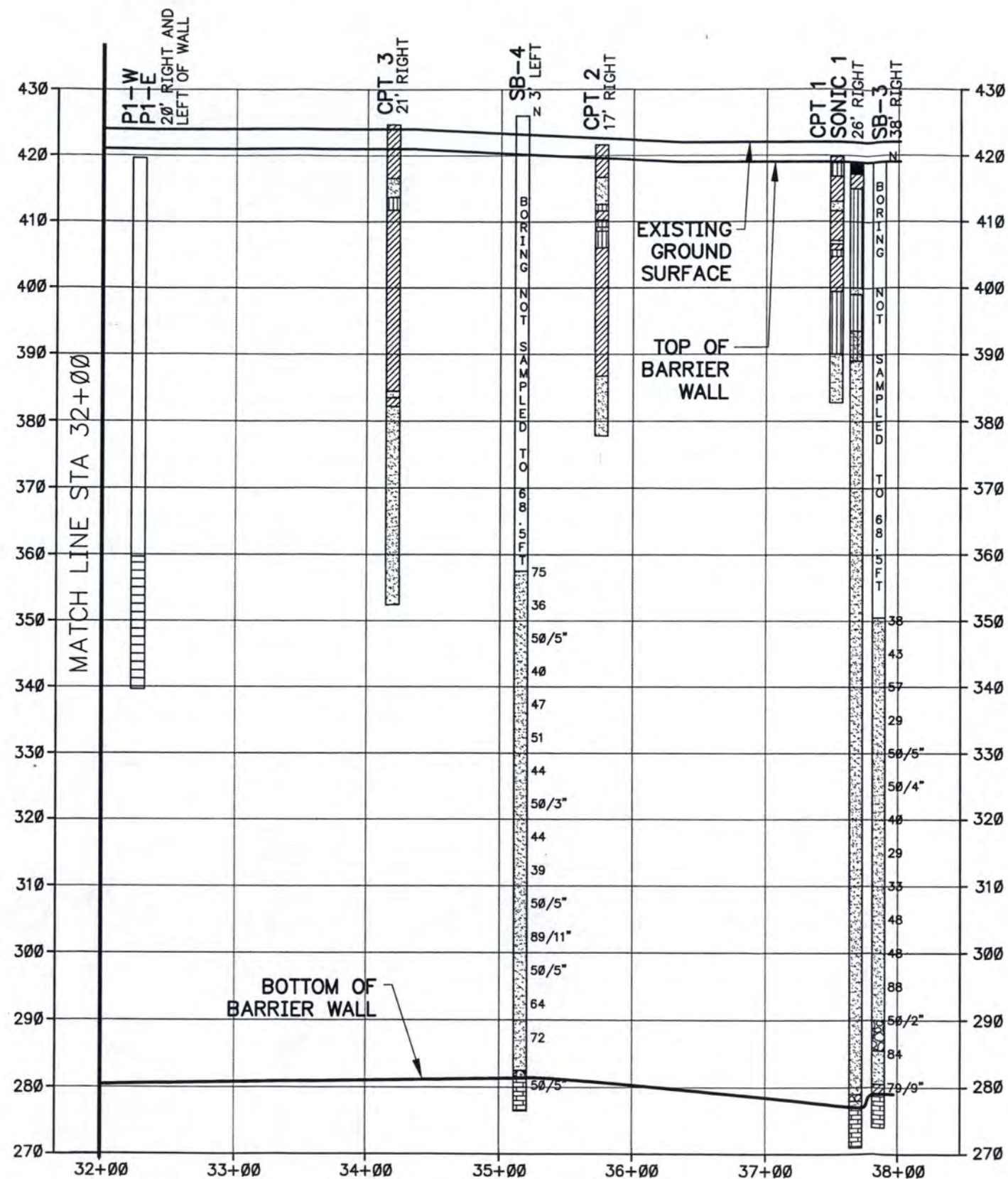


SOLUTIA INC.
 575 MARYVILLE CENTRE DRIVE
 ST. LOUIS, MO. 63141

GROUNDWATER MIGRATION CONTROL SYSTEM	URS PROJECT NO.
PACKAGE 2 - BARRIER WALL	21561192.00001
BARRIER WALL - PROFILE STA 12+00 TO 21+50	SHEET NO.
	2-10



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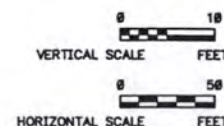


LEGEND

- CLAY (CL OR CH)
- SILT (ML)
- CLAYEY SAND (SC)
- SAND (SP OR SW)
- GRAVEL AND/OR COBBLES
- LIMESTONE
- PROPOSED SCREENED INTERVAL OF EXTRACTION WELL OR PIEZOMETER
- 10+00 WALL STATION AT CENTERLINE OF BARRIER WALL
- CPT-1 CONE PENETROMETER TEST NUMBER (2001)
- SONIC 1 SONIC BORING NUMBER (2002)
- SB-1 SOIL BORING NUMBER (2002)
- 62 STANDARD PENETRATION TEST BLOW COUNT (N). BLOWS /12" PENETRATION OF SAMPLER UNLESS INDICATED OTHERWISE
- P HYDRAULICALLY PUSHED SAMPLE

NOTES:

- 1) THESE GRAPHIC LOGS DEPICT GENERALIZED SOIL CONDITIONS. REFER TO INDIVIDUAL LOGS FOR DETAILS.
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NO.	DATE	REVISION DESCRIPTION	APPROVED

PREPARED BY:

URS

1001 Highlands Plaza Dr. West, Suite 300
St. Louis, MO 63110
Tel: 314-429-0100
fax: 314-429-0462

SEAL

DATE: 7/3/03

SCALE: AS SHOWN

DESIGNED: KMB

DRAWN: DJD/WDL

CHECKED: KMB

SUBMITTED:



SOLUTIA INC.
575 MARYVILLE CENTRE DRIVE
ST. LOUIS, MO. 63141

Applied Chemistry, Creative Solutions

GROUNDWATER MIGRATION CONTROL SYSTEM

PACKAGE 2 - BARRIER WALL

BARRIER WALL - PROFILE
STA 32+00 TP 37+97

URS PROJECT NO.

21561192.00001

SHEET NO.

2-12

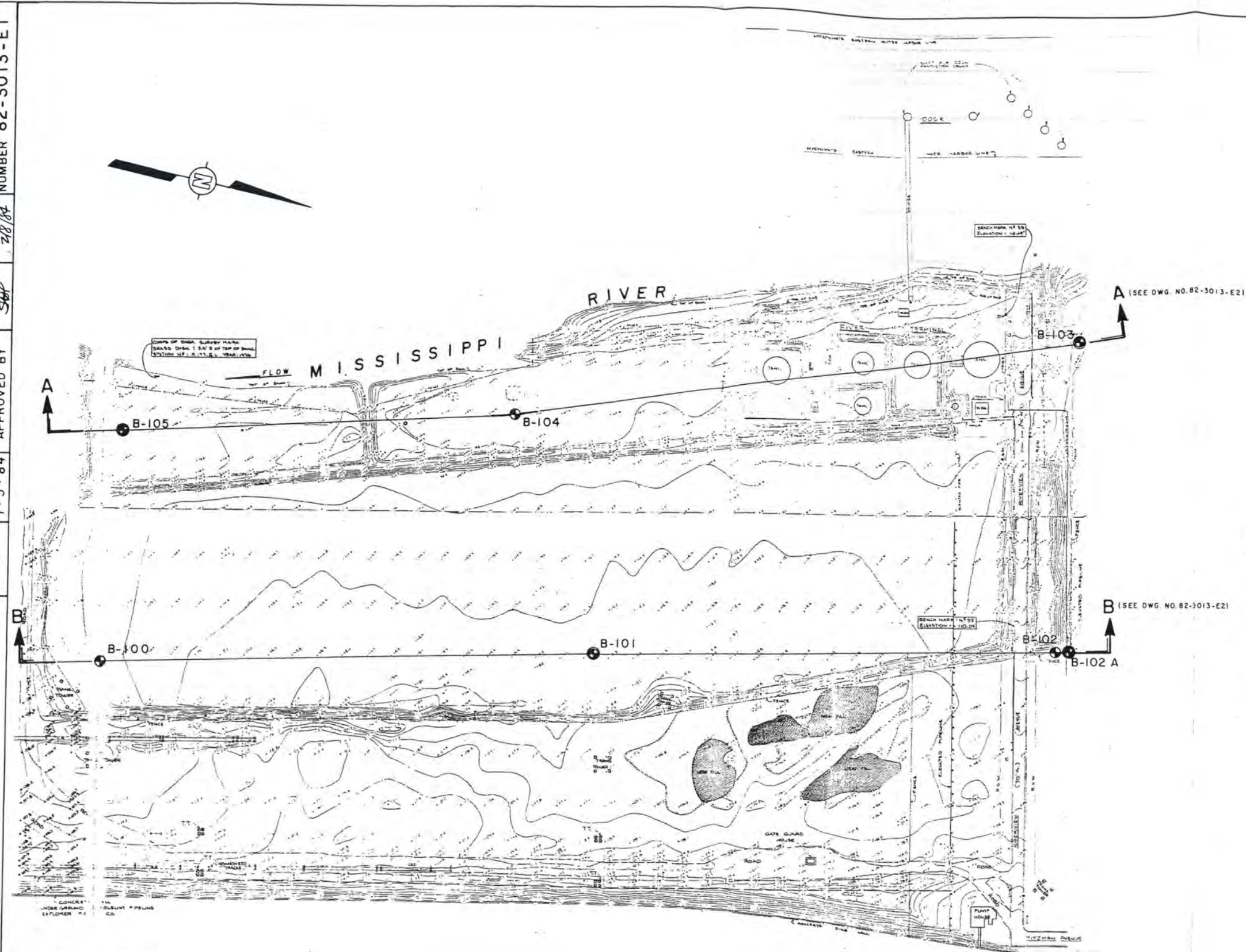
GEOLOGIC SECTIONS
D'APPOLONIA BEDROCK INVESTIGATION
JANUARY 1984

DRAWING NUMBER 82-3013-E1

CHECKED BY J J L 1-5-84

APPROVED BY J J L 1-5-84

DRAWN BY J J L 1-5-84



REFERENCE:
MONSANTO DRAWINGS TS-E-17408
AND TS-E-17409, TITLED: TOPOGRAPHIC
SURVEY LOT "H" LANDFILL AREA DRILL SITE 5,
AND DRILL SITES 1, 2, 4. SCALE: 1"=50'
DATED: SEPT. 1982.

LEGEND:
B-100 ● BORING LOCATION
B-102A ● BORING LOCATION WITH PIEZOMETER INSTALLED

NOTE:
PLANT ELEVATION 100.0' IS EQUAL TO
USGS MEAN SEA LEVEL ELEVATION 412.5.

REFERENCE:
MONSANTO, KRUMMRICH PLANT SITE
DEVELOPMENT MANUAL, I.G. ART 4, DEC. 1977.

WGK 1045235

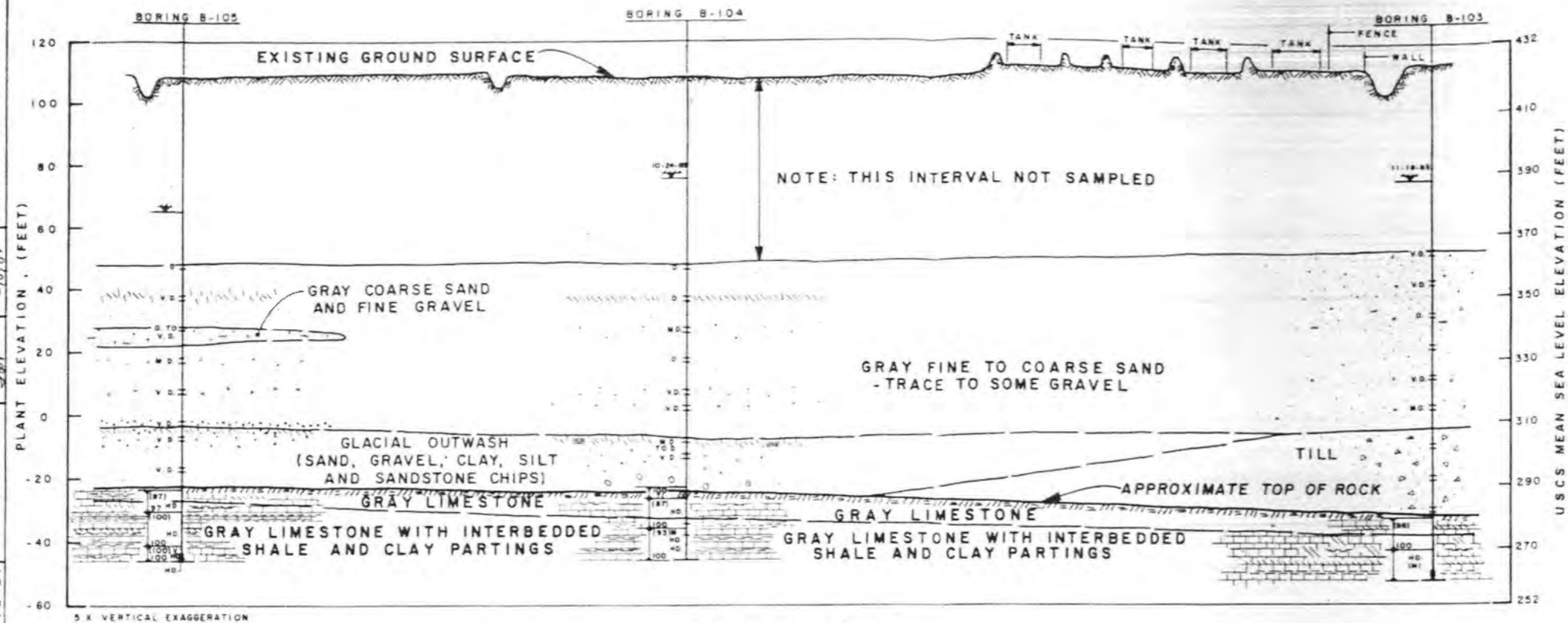
SCALE
100 0 100 200 FEET

FIGURE 1
PLAN AND LOCATION OF BORINGS
BEDROCK INVESTIGATION
WASTE LANDFILL
W.G. KRUMMRICH PLANT
SAUGET, ILLINOIS
PREPARED FOR

MONSANTO COMPANY
ST. LOUIS, MISSOURI

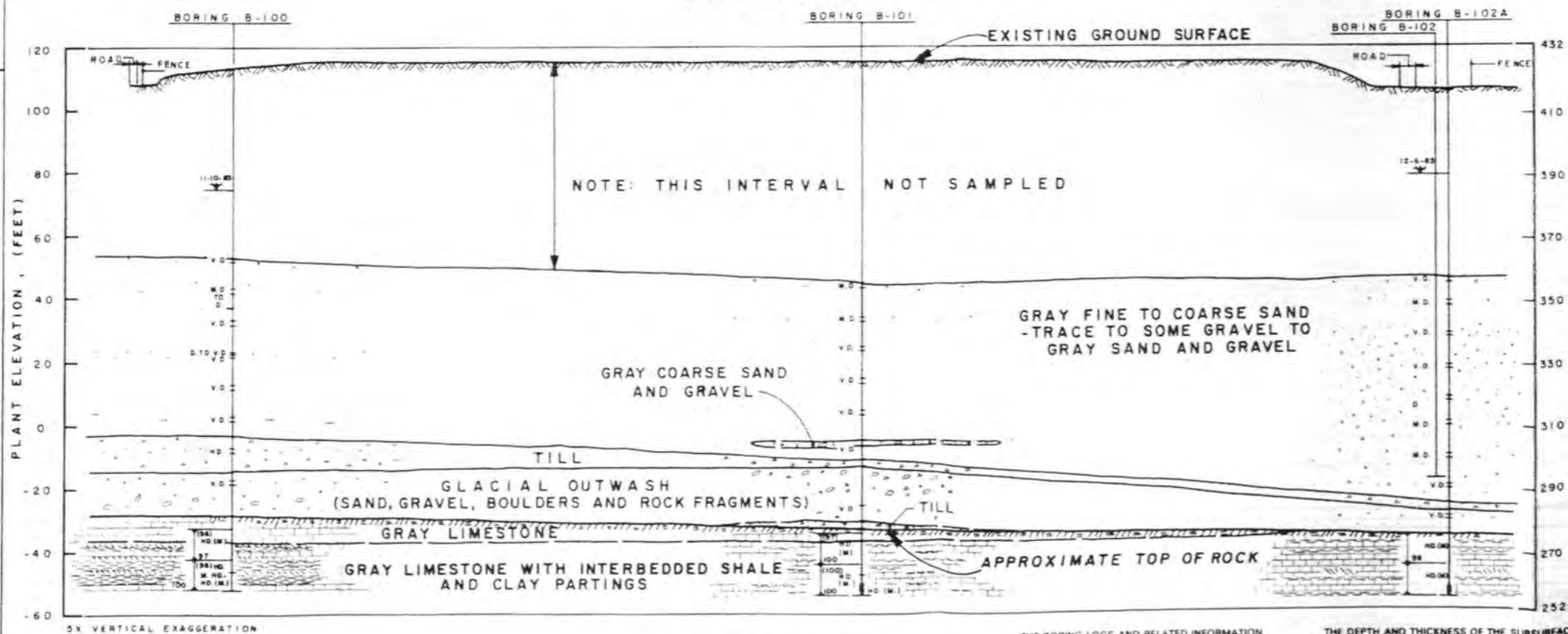
D'APPOLONIA

DRAWING NUMBER 82-3013-E2
 CHECKED BY J.J.L. 1-16-84
 APPROVED BY J.J.L. 1-16-84
 DRAWN BY J.J.L. 1-16-84



SECTION A-A

(LOOKING SOUTHWEST)



SECTION B-B

(LOOKING SOUTHWEST)

THE BORING LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED. SOIL CONDITIONS AND WATER LEVELS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE BORING LOCATIONS. ALSO THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE CONDITIONS AT THESE BORING LOCATIONS.

THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE TEST BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE LOCATION OF THE TEST BORINGS AND IT IS POSSIBLE THAT SUBSURFACE CONDITIONS BETWEEN THE TEST BORINGS MAY VARY FROM THOSE INDICATED.

<u>SOIL CLASSIFICATION</u>	
V SO. - VERY SOFT	CONSISTENCY OF COHESIVE SOILS
SO. - SOFT	
M ST - MEDIUM STIFF	
ST - STIFF	
V ST - VERY STIFF	
HD - HARD	
V L. - VERY LOOSE	DENSITY OF GRANULAR SOILS
L - LOOSE	
MD - MEDIUM DENSE	
D - DENSE	
VD - VERY DENSE	

<u>ROCK CLASSIFICATION</u>	
V SO. - VERY SOFT	RELATIVE DEGREES OF ROCK CORE HARDNESS
SO. - SOFT	
M HD. - MEDIUM HARD	
HD. - HARD	
V HD. - VERY HARD	
VB - VERY BROKEN	SPACING OF DISCONTINUITIES IN THE ROCK
B - BROKEN	
SB - SLIGHTLY BROKEN	
M. - MASSIVE	

WGK 1045236

- NOTES:
1. PLANT ELEVATION 100.0' IS EQUAL TO USGS MEAN SEA LEVEL ELEVATION 412.5
 2. FOR PLAN AND LOCATION OF BORINGS AND SECTIONS SEE DWG. NO. 82-3013-E1
 3. FOR DETAILED DESCRIPTION OF BORINGS, SEE APPENDIX OF REPORT.



FIGURE 2

BEDROCK INVESTIGATION
 SECTIONS A-A AND B-B
 WASTE LANDFILL
 W.G. KRUMMICH PLANT
 SAUGET, ILLINOIS
 PREPARED FOR

MONSANTO COMPANY
 ST. LOUIS, MISSOURI

D'APPOLONIA

Notes

LINE OF EVIDENCE 1

SURFACE WATER LEVEL > GROUNDWATER LEVEL

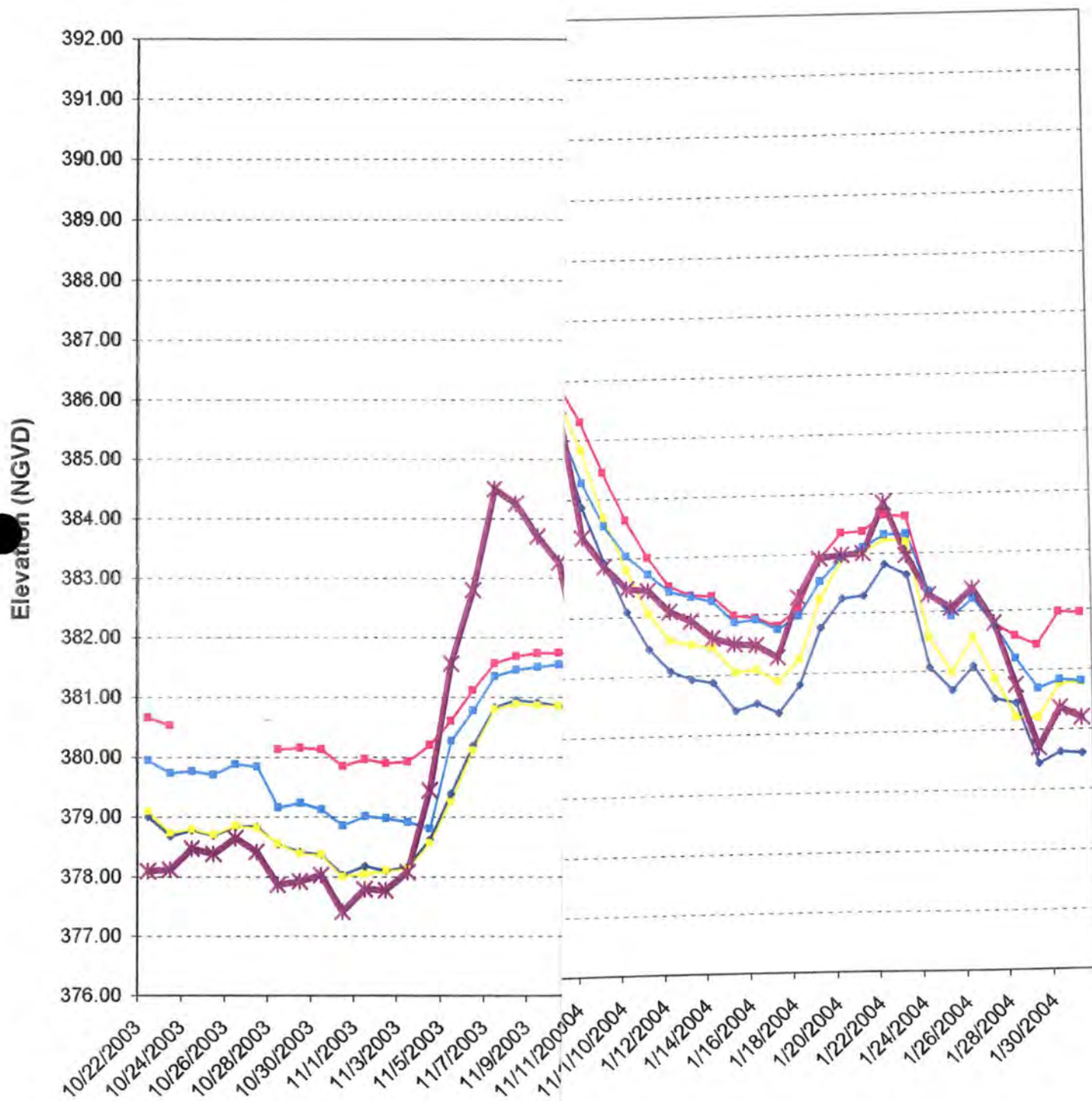
GRADIENT REVERSAL - NO DISCHARGE TO SURFACE WATER

OCTOBER 2003 to JANUARY 2004

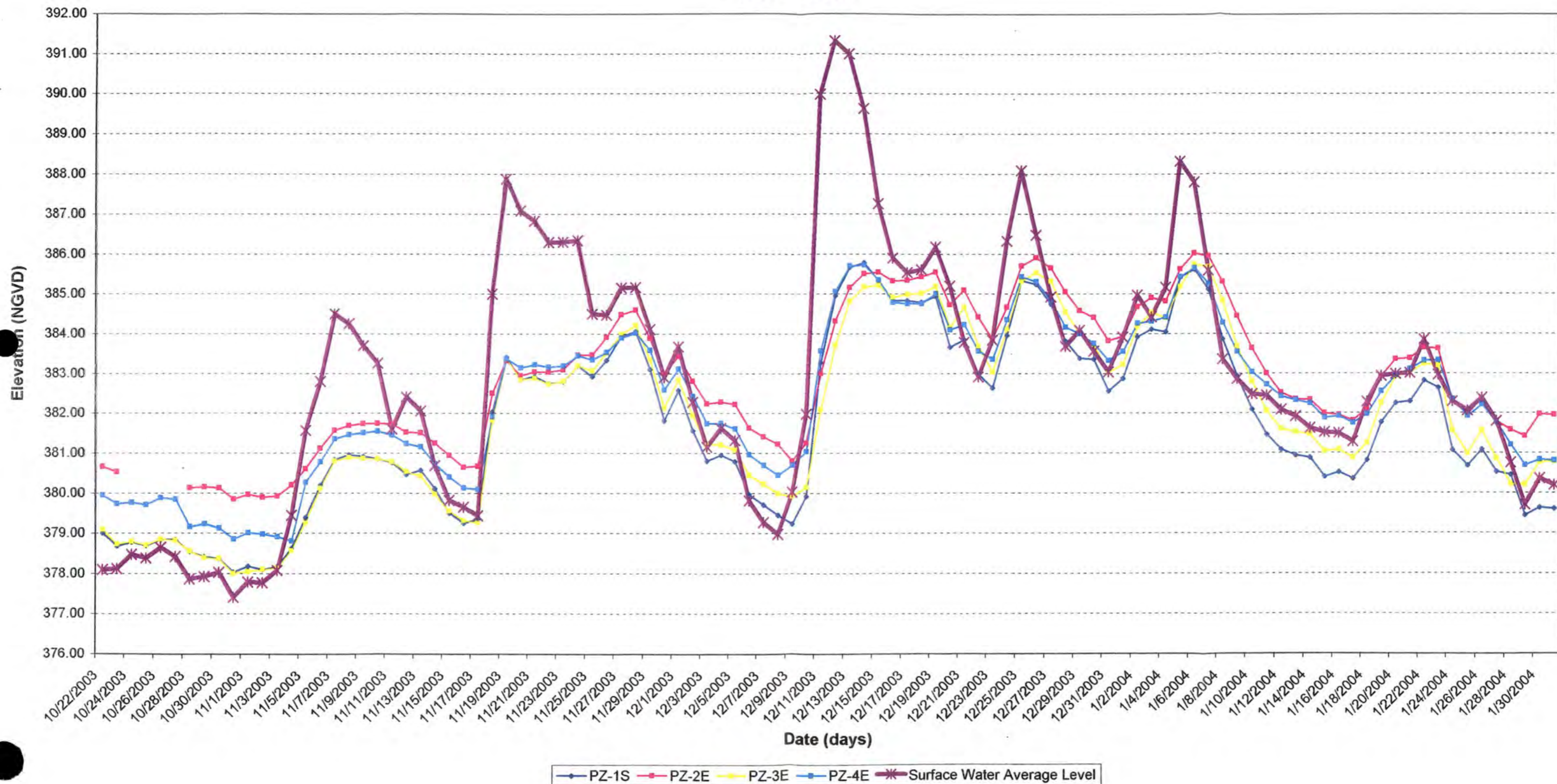
LINE OF EVIDENCE 1

Surface Water Levels Greater Than Groundwater Levels
Gradient Reversal - No Discharge to Surface Water
October 22, 2003 to January 31, 2004

<u>Day</u>	<u>Days with Groundwater Control</u>			
	<u>October 2003</u>	<u>November 2003</u>	<u>December 2003</u>	<u>January 2004</u>
1			•	
2				•
3				
4				•
5		•		•
6		•		•
7		•		
8		•		
9		•		
10		•	•	
11			•	
12		•	•	
13		•	•	
14			•	
15			•	
16			•	
17			•	
18		•	•	
19		•	•	•
20		•	•	
21		•		
22		•		•
23		•		
24		•	•	
25		•	•	•
26		•	•	•
27		•		
28		•		
29		•		
30				
31				



Hydraulic Control
Sauget Area 2 Groundwater Migration Control System
Line of Evidence 1
Surface Water Level Greater Than Groundwater Level
(SWL > GWL)



LINE OF EVIDENCE 2

SURFACE WATER LEVEL > PUMPING WATER LEVEL

GRADIENT FROM RIVER TO PUMPING WELLS

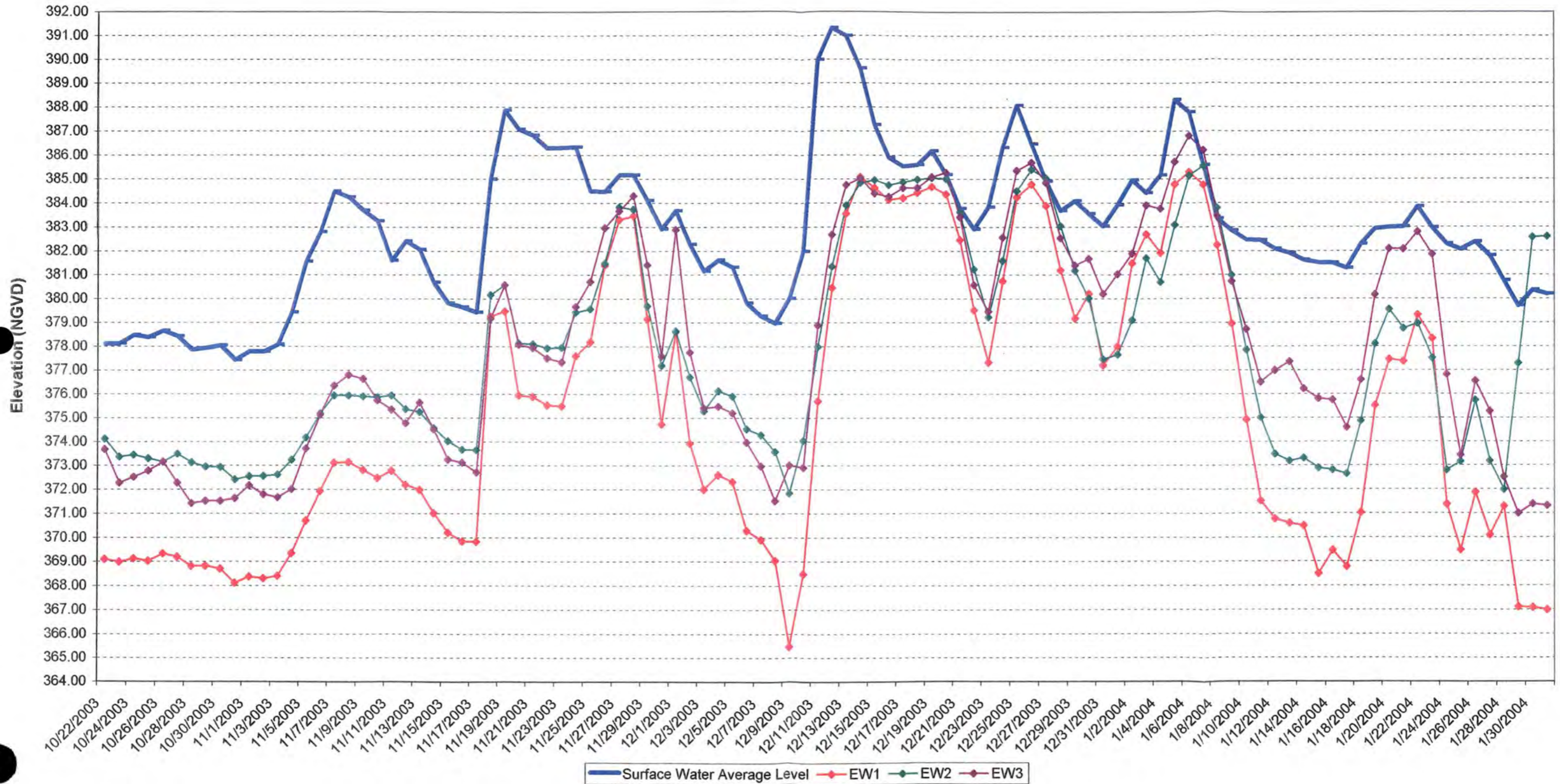
OCTOBER 2003 to JANUARY 2004

LINE OF EVIDENCE 2

Surface Water Levels Greater Than Pumping Water Levels
Gradient from River to Pumping Wells
October 22, 2003 to January 31, 2004

Day	Days with Groundwater Control			
	<u>October 2003</u>	<u>November 2003</u>	<u>December 2003</u>	<u>January 2004</u>
1		•	•	•
2		•	•	•
3		•	•	•
4		•	•	•
5		•	•	•
6		•	•	•
7		•	•	•
8		•	•	•
9		•	•	•
10		•	•	•
11		•	•	•
12		•	•	•
13		•	•	•
14		•	•	•
15		•	•	•
16		•	•	•
17		•	•	•
18		•	•	•
19		•	•	•
20		•	•	•
21		•	•	•
22	•	•	•	•
23	•	•	•	•
24	•	•	•	•
25	•	•	•	•
26	•	•	•	•
27	•	•	•	•
28	•	•	•	•
29	•	•	•	•
30	•	•	•	•
31	•		•	•

Hydraulic Control
Sauget Area 2 Groundwater Migration Control System
Line of Evidence 2
Surface Water Level Greater Than Pumping Water Level
(SWL > PWL)



LINE OF EVIDENCE 3

GROUNDWATER LEVEL > PUMPING WATER LEVEL

GRADIENT FROM PIEZOMETERS TO PUMPING WELLS

OCTOBER 2003 to JANUARY 2004

LINE OF EVIDENCE 3

Groundwater Levels Greater Than Pumping Water Levels
Gradient from Piezometers to Pumping Wells
October 22, 2003 to January 31, 2004

Day	Days with Groundwater Control			
	<u>October 2003</u>	<u>November 2003</u>	<u>December 2003</u>	<u>January 2004</u>
1		•	•	•
2		•	•	•
3		•	•	•
4		•	•	•
5		•	•	•
6		•	•	•
7		•	•	•
8		•	•	•
9		•	•	•
10		•	•	•
11		•	•	•
12		•	•	•
13		•	•	•
14		•	•	•
15		•	•	•
16		•	•	•
17		•	•	•
18		•	•	•
19		•	•	•
20		•	•	•
21		•	•	•
22	•	•	•	•
23	•	•	•	•
24	•	•	•	•
25	•	•	•	•
26	•	•	•	•
27	•	•	•	•
28	•	•	•	•
29	•	•	•	•
30	•	•	•	•
31	•		•	•

Hydraulic Control
Sauget Area 2 Groundwater Migration Control System
Line of Evidence 3
Ground Water Level Greater Than Pumping Water Level
(GWL > PWL)



LINE OF EVIDENCE 4

SURFACE WATER LEVEL > GROUNDWATER LEVEL

GRADIENT REVERSAL - NO DISCHARGE TO SURFACE WATER

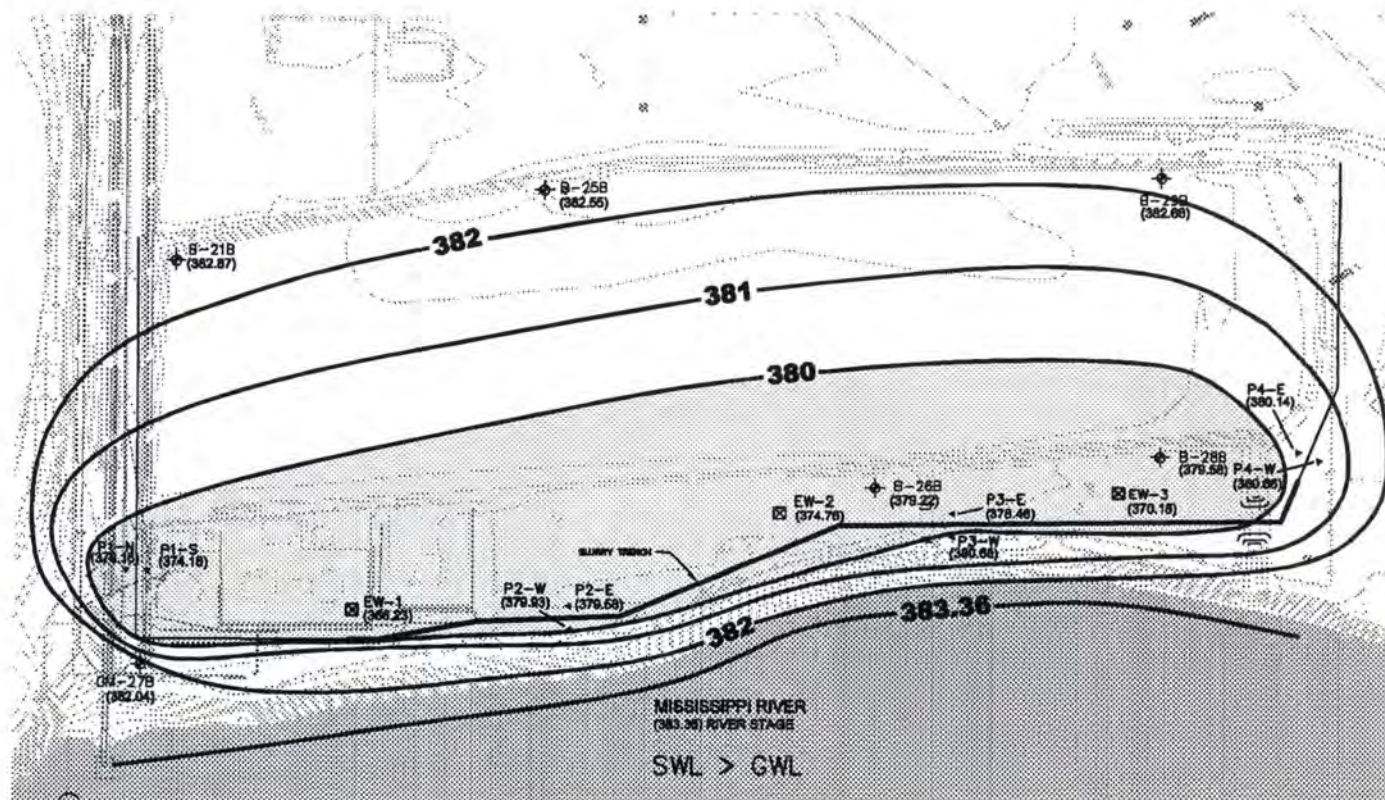
FEBRUARY to APRIL 2004

SECTION 2 - HYDRAULIC CONTROL OF GROUNDWATER MIGRATION

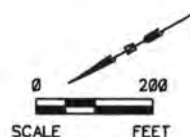
LINE OF EVIDENCE 4

February 1, 2004 to April 11, 2004

Day	Days with Groundwater Control		
	February 2004	March 2004	April 2004
1		•	•
2		•	•
3		•	•
4		•	•
5		•	•
6		•	•
7		•	•
8		•	•
9		•	•
10		•	•
11		•	•
12		•	
13		•	
14		•	
15		•	
16		•	
17		•	
18		•	
19		•	
20		•	
21	•	•	
22	•	•	
23	•	•	
24	•	•	
25	•	•	
26	•	•	
27	•	•	
28	•	•	
29	•	•	
30		•	
31		•	



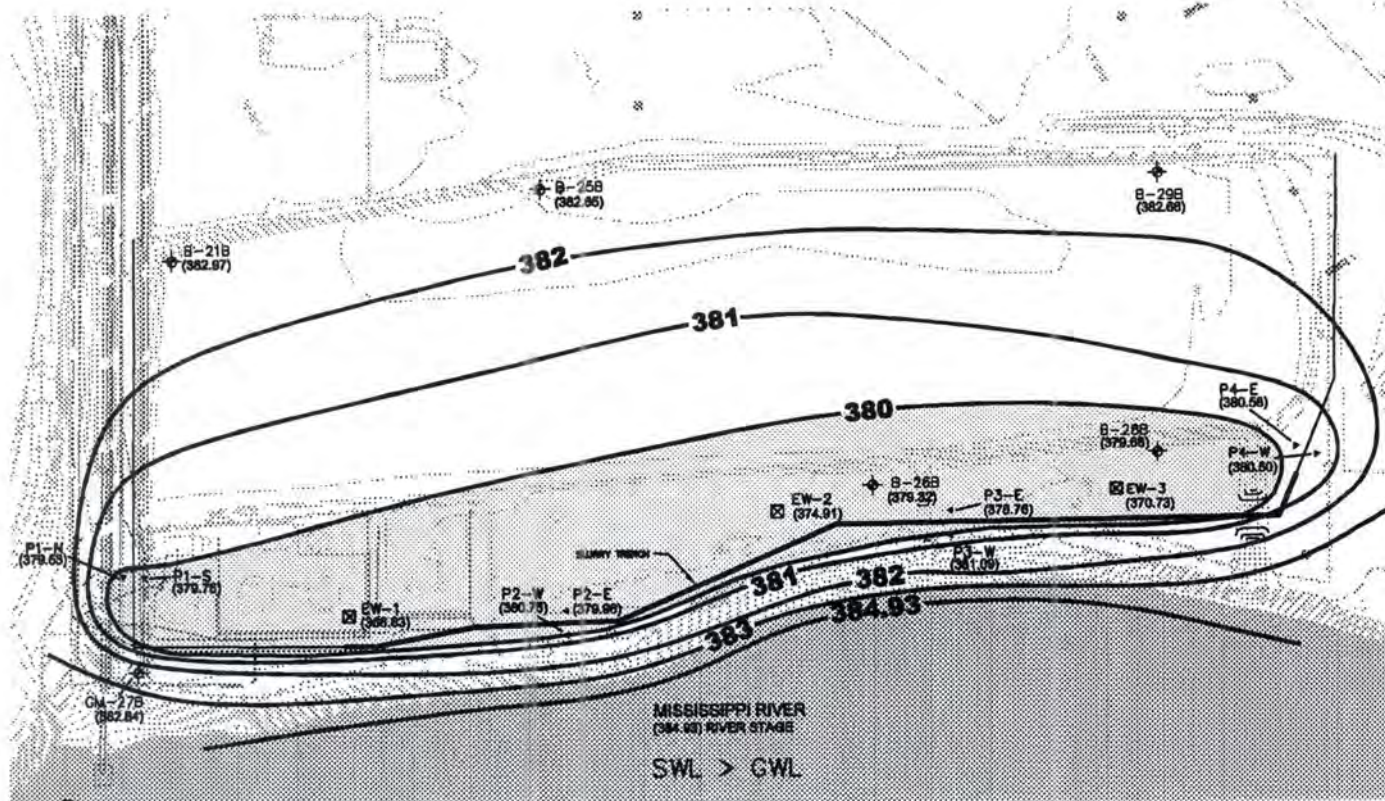
- LEGEND**
- 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 - (379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL
- GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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SOLUTIA INC.
575 MARYVILLE CENTRE DRIVE
ST. LOUIS, MO. 63141

GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation February 23, 2004	FIG. NO. 7



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

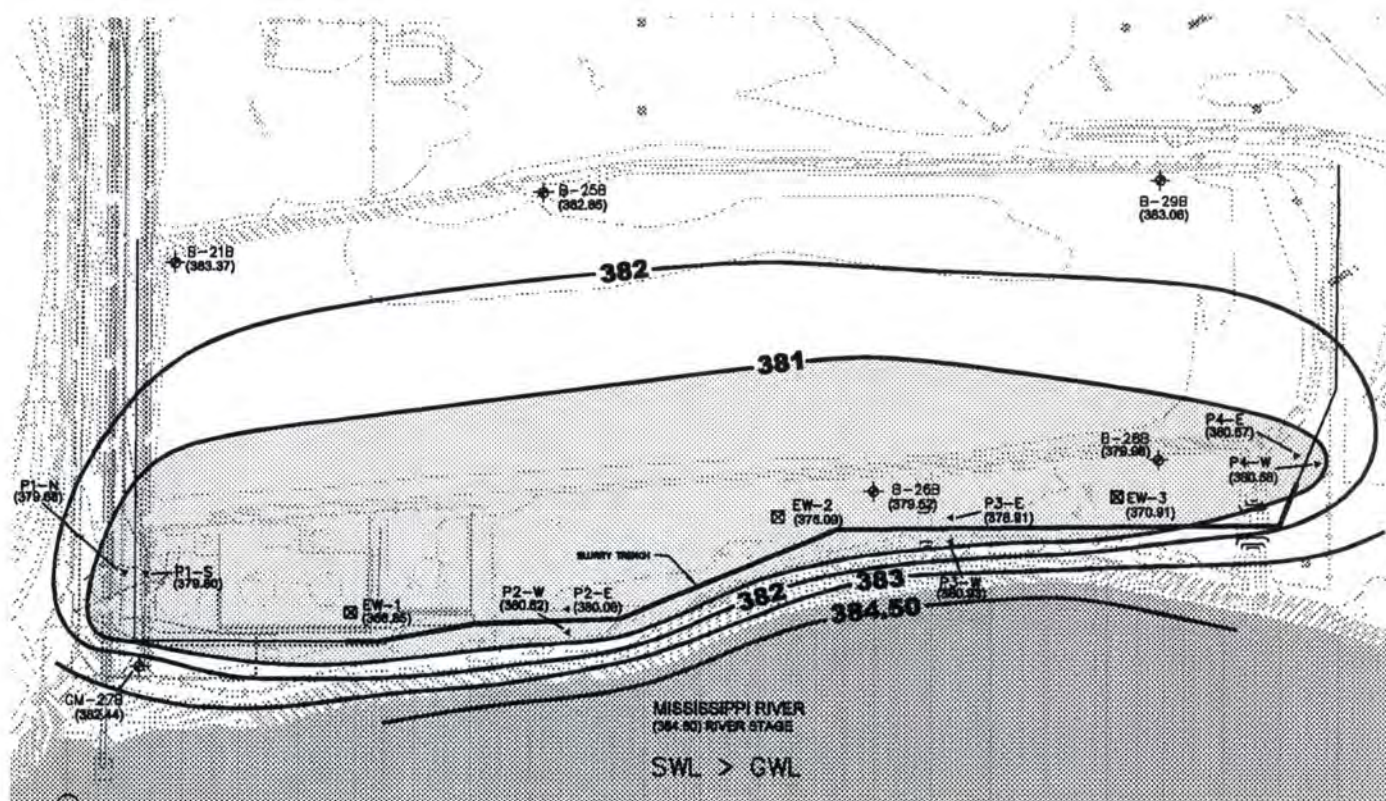
— HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



<p>SOLUTIATM Applied Chemistry, Creative Solutions</p>	<p>SOLUTIA INC. 575 MARYVILLE CENTRE DRIVE ST. LOUIS, MO. 63141</p>	<p>GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS</p>	<p>PROJECT NO.</p>
		<p>Groundwater Elevation February 24, 2004</p>	<p>FIG. NO. 8</p>



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

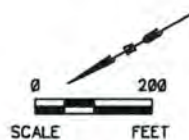
— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

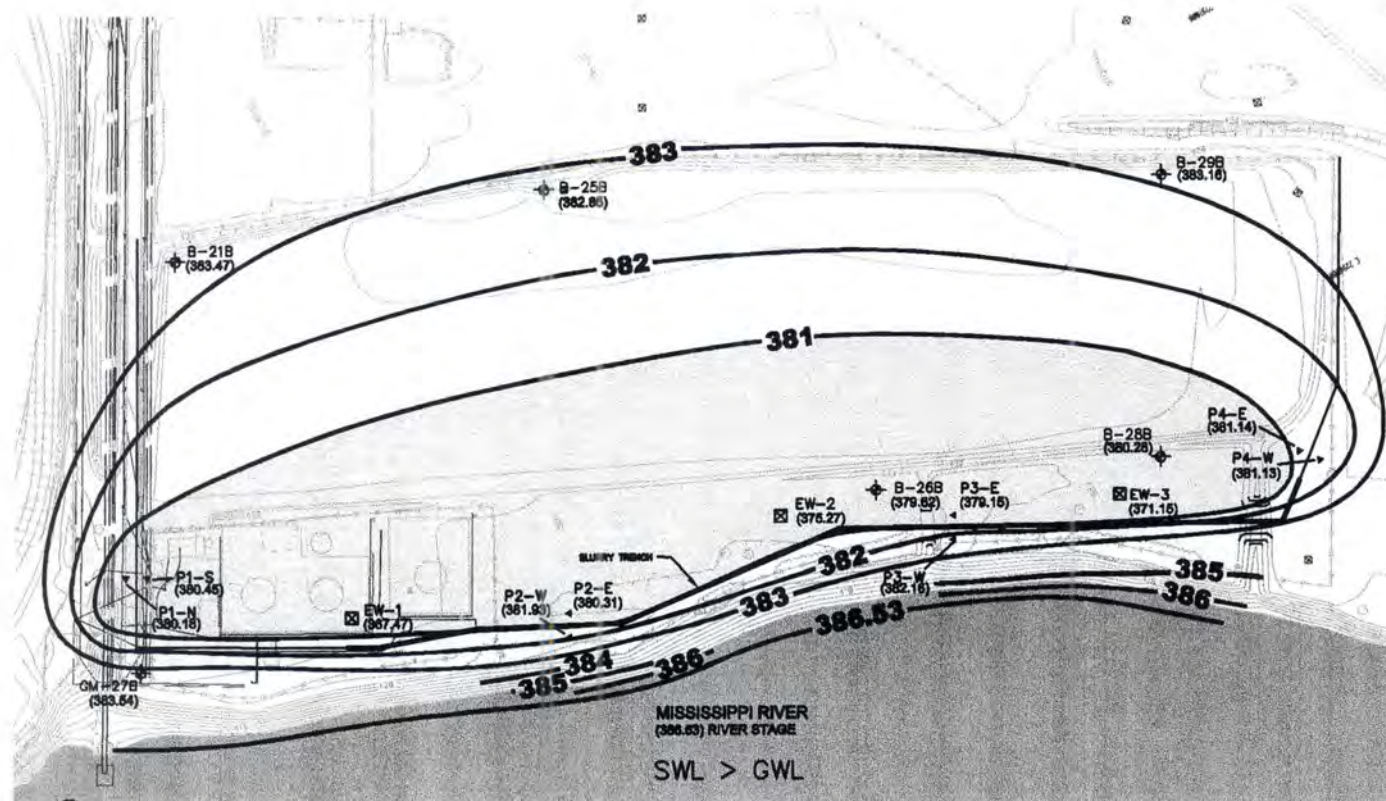
GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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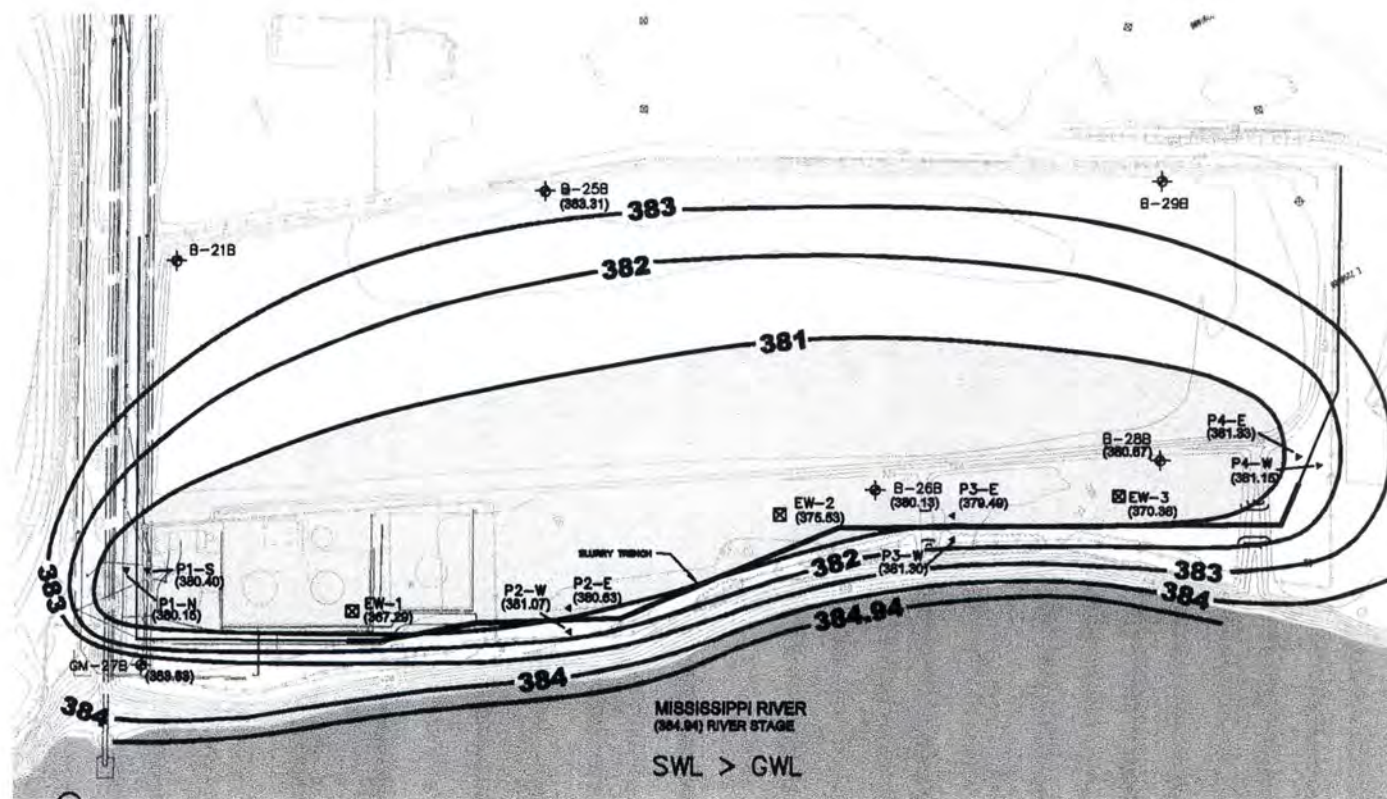
GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation February 25, 2004	FIG. NO. 9



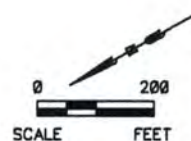
LEGEND
 — 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION
 — COMPLETED SLURRY TRENCH
 — TRENCH WALL ALIGNMENT
 — HYDRAULIC TROUGH
 SWL > GWL
 GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



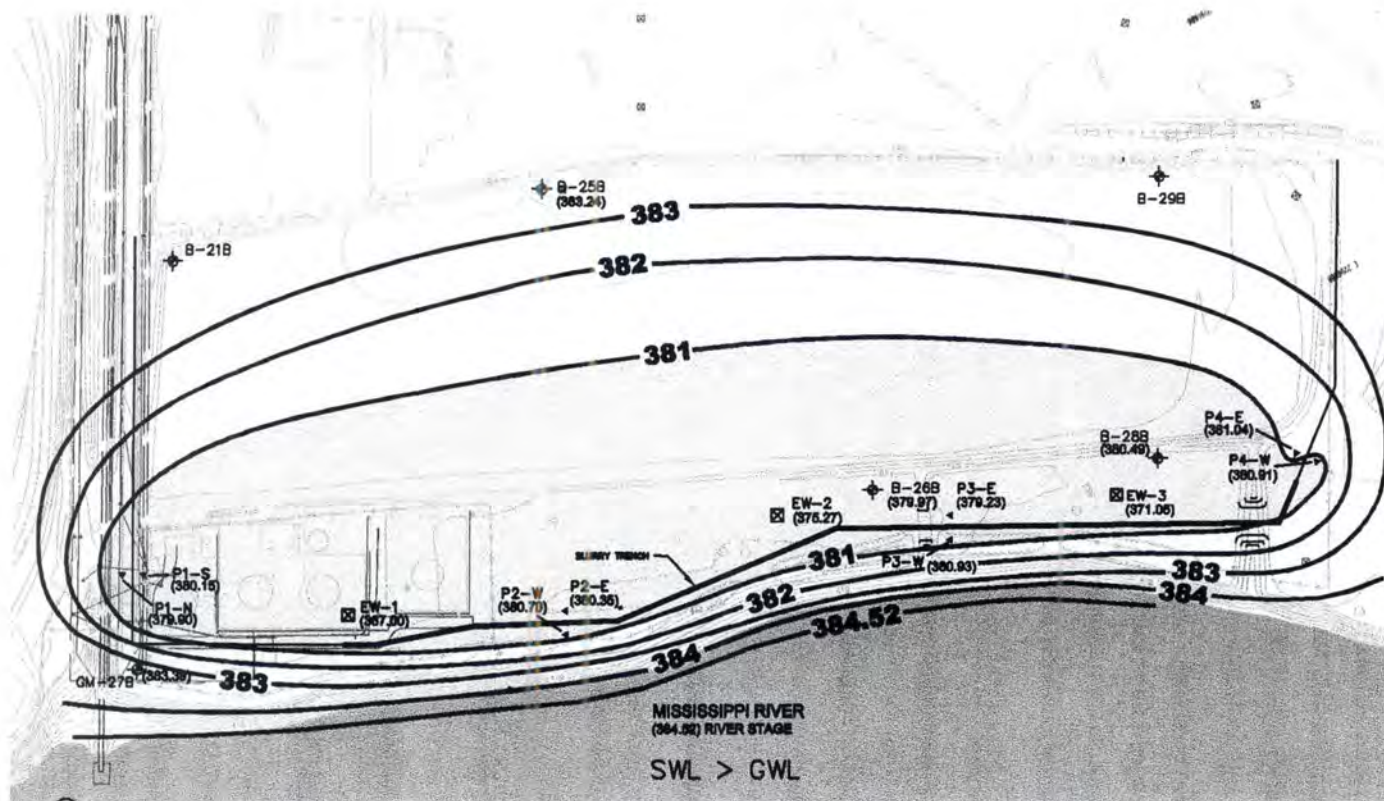
 SOLUTIA ™ Applied Chemistry, Creative Solutions	GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO. FIG. NO.
	Solutia Inc. 575 MARYVILLE CENTRE DRIVE ST. LOUIS, MO. 63141	Groundwater Elevation February 26, 2004 10



- LEGEND**
- 379 —** GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 - (379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL
 - GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



 Solutia Inc. 575 MARYVILLE CENTRE DRIVE ST. LOUIS, MO. 63141 Applied Chemistry, Creative Solutions	GROUNDWATER MIGRATION CONTROL SYSTEM	PROJECT NO.
	SITE-R SAUGET, ILLINOIS Groundwater Elevation March 01, 2004	FIG. NO. 11



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

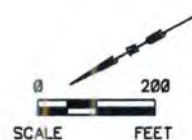
— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

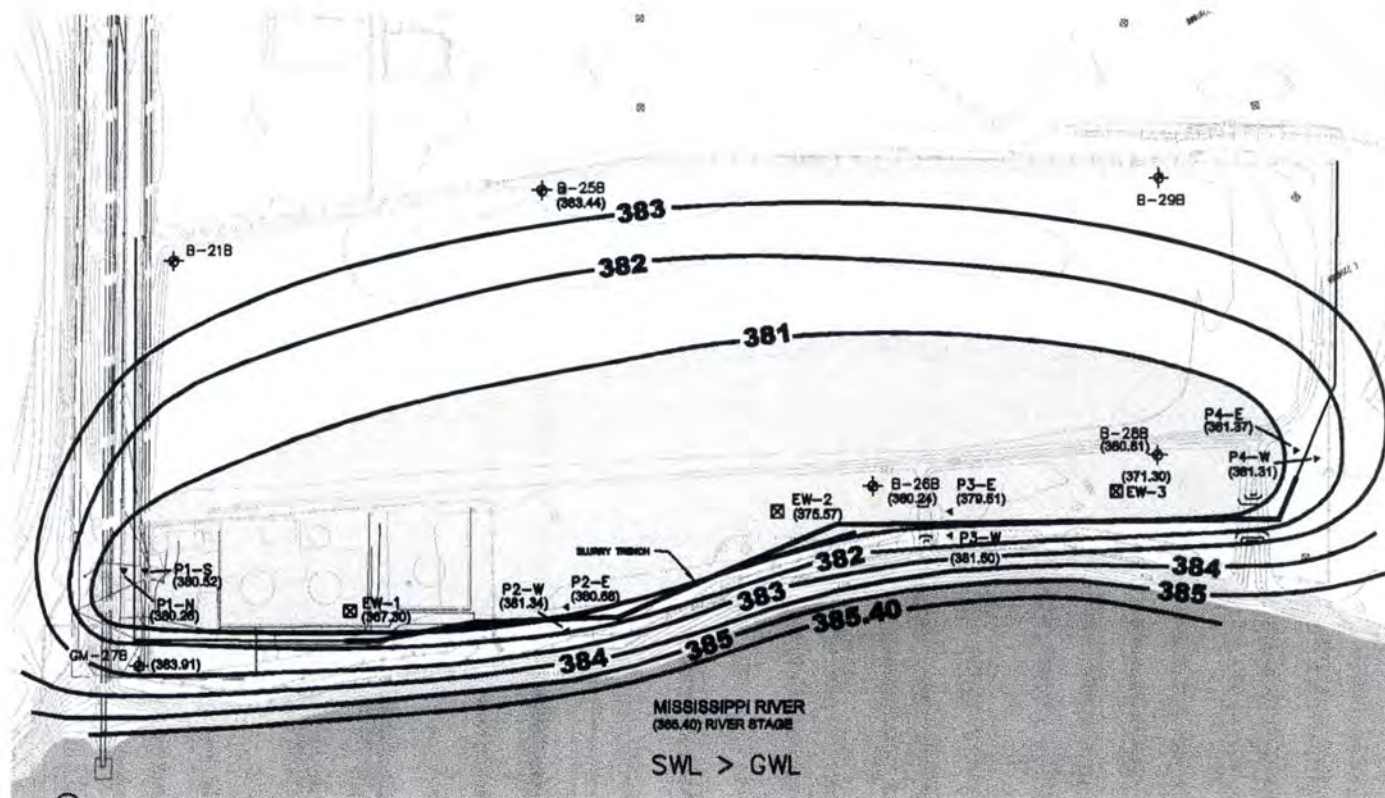
GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation March 02, 2004	FIG. NO. 12



LEGEND

-379- GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

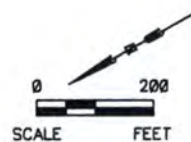
COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

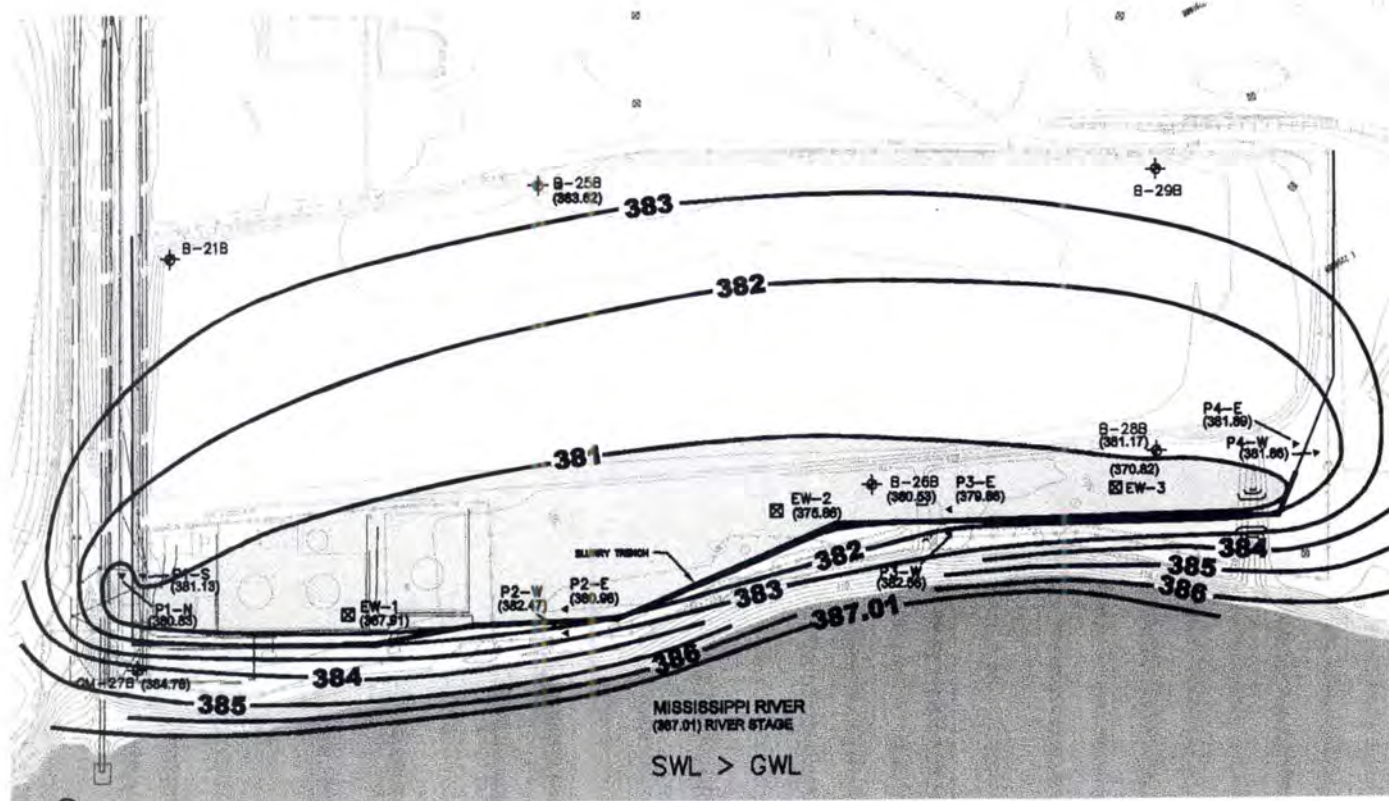
HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



<p>SOLUTIATM Applied Chemistry, Creative Solutions</p>	<p>SOLUTIA INC. 575 MARYVILLE CENTRE DRIVE ST. LOUIS, MO. 63141</p>	<p>GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS</p>	<p>PROJECT NO.</p>
	<p>Groundwater Elevation March 03, 2004</p>		<p>FIG. NO. 13</p>



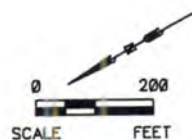
LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH
— TRENCH WALL ALIGNMENT
— HYDRAULIC TROUGH

SWL > GWL

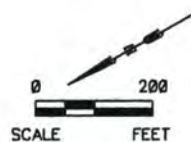
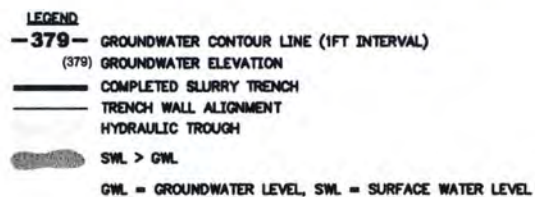
GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation March 04, 2004	FIG. NO. 14



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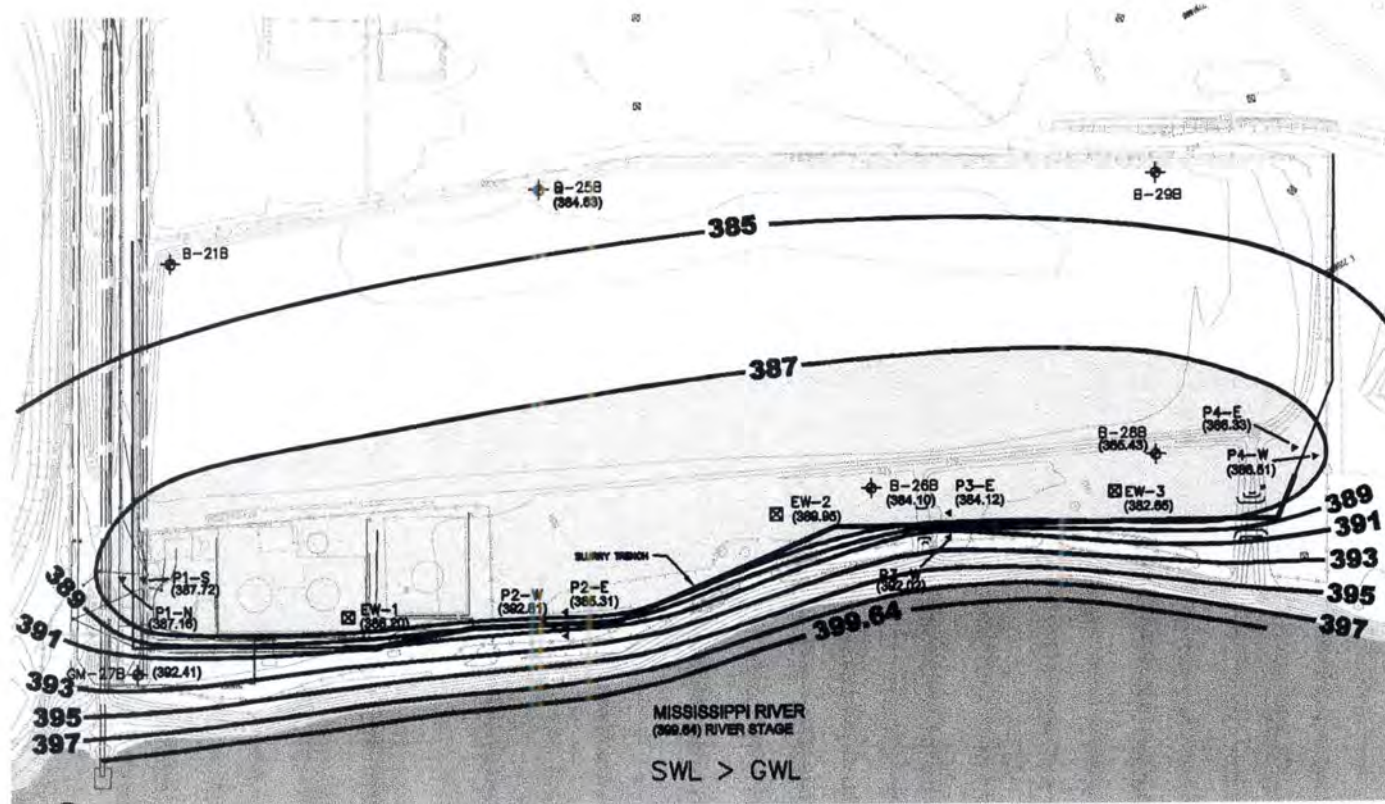
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GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 05, 2004

PROJECT NO.	
-------------	--

FIG. NO.
15



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (2FT INTERVAL)
 (379) GROUNDWATER ELEVATION

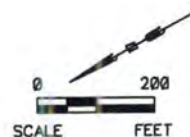
— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

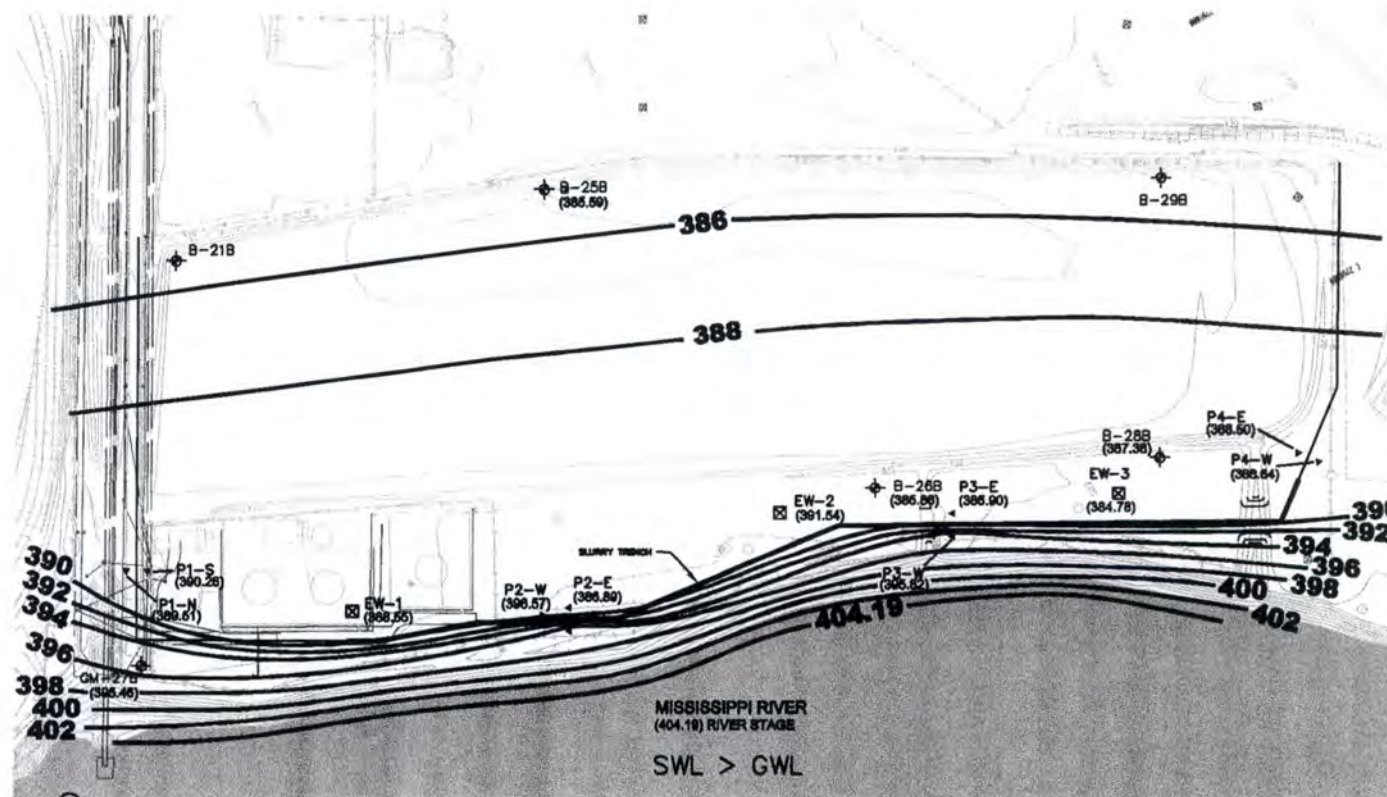
GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation March 06, 2004	FIG. NO. 16



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (2FT INTERVAL)

(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

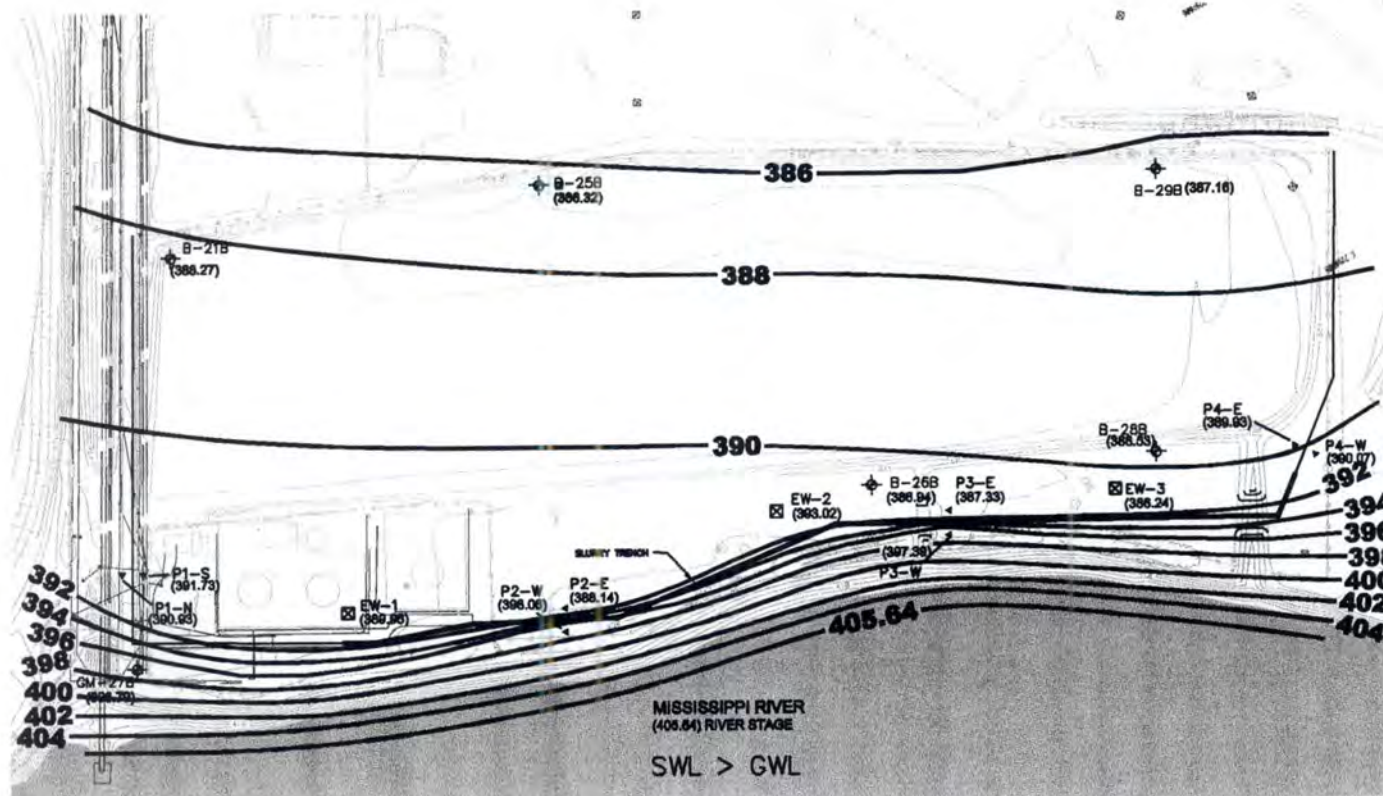
GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation March 07, 2004	FIG. NO. 17



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (2FT INTERVAL)
(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

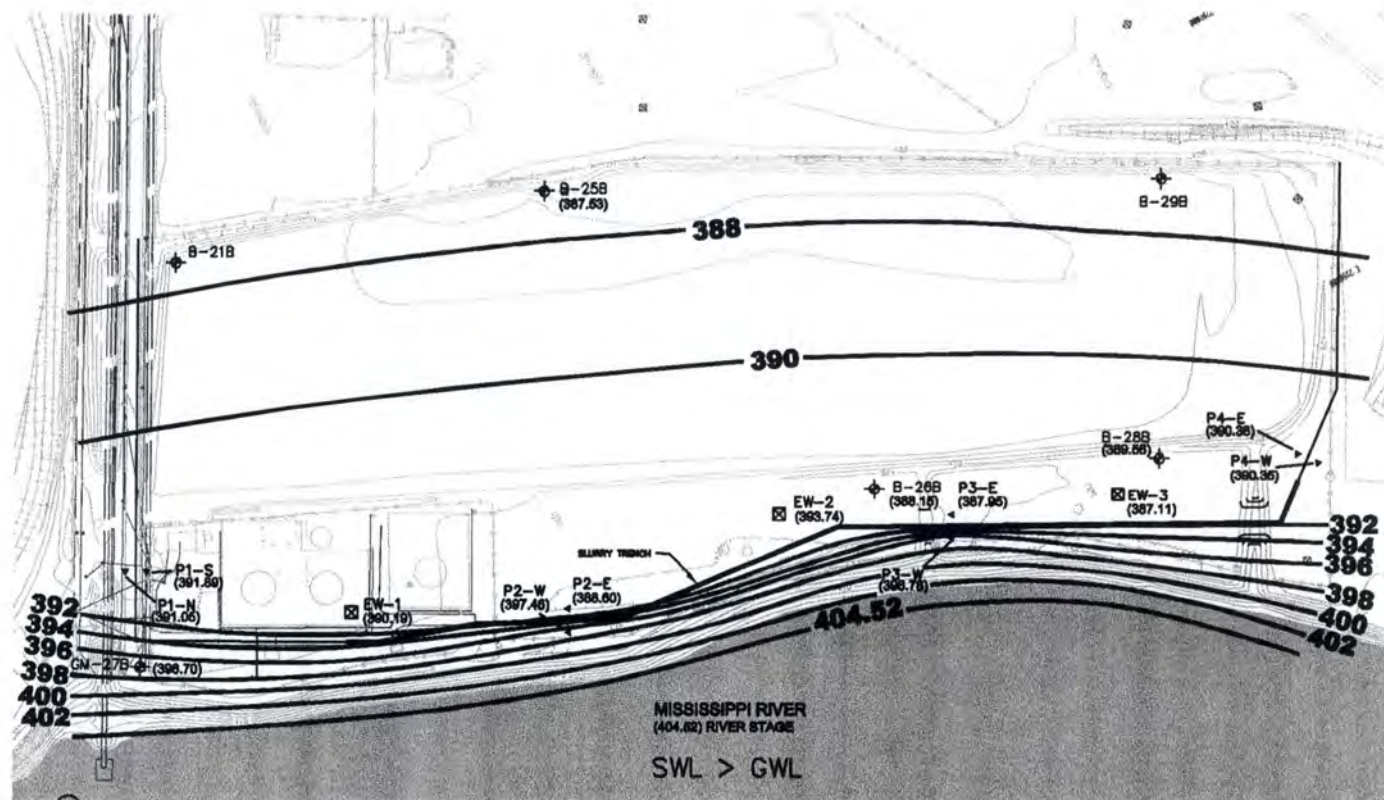
GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

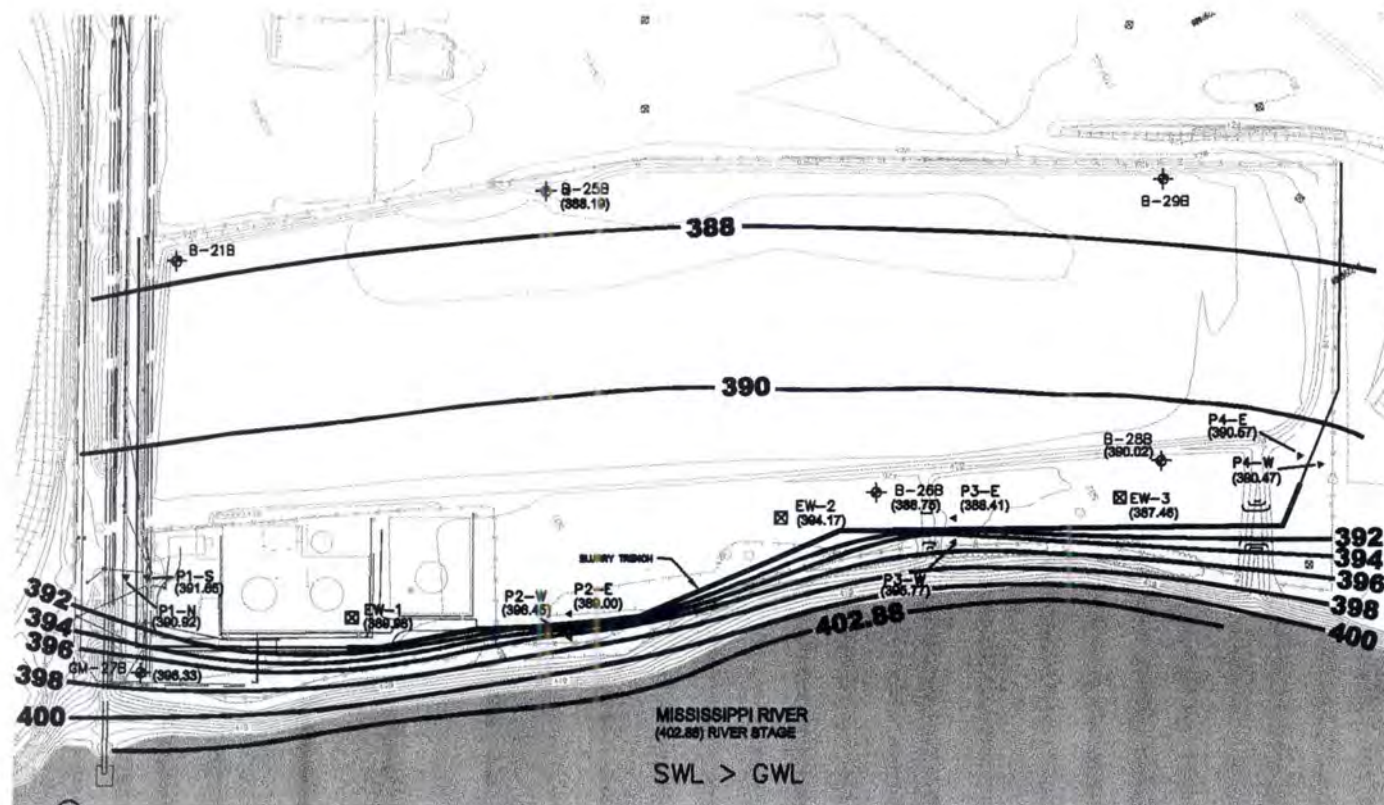


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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
	FIG. NO.
Groundwater Elevation March 08, 2004	18





LEGEND

— 379 — GROUNDWATER CONTOUR LINE (2 FT INTERVAL)

(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

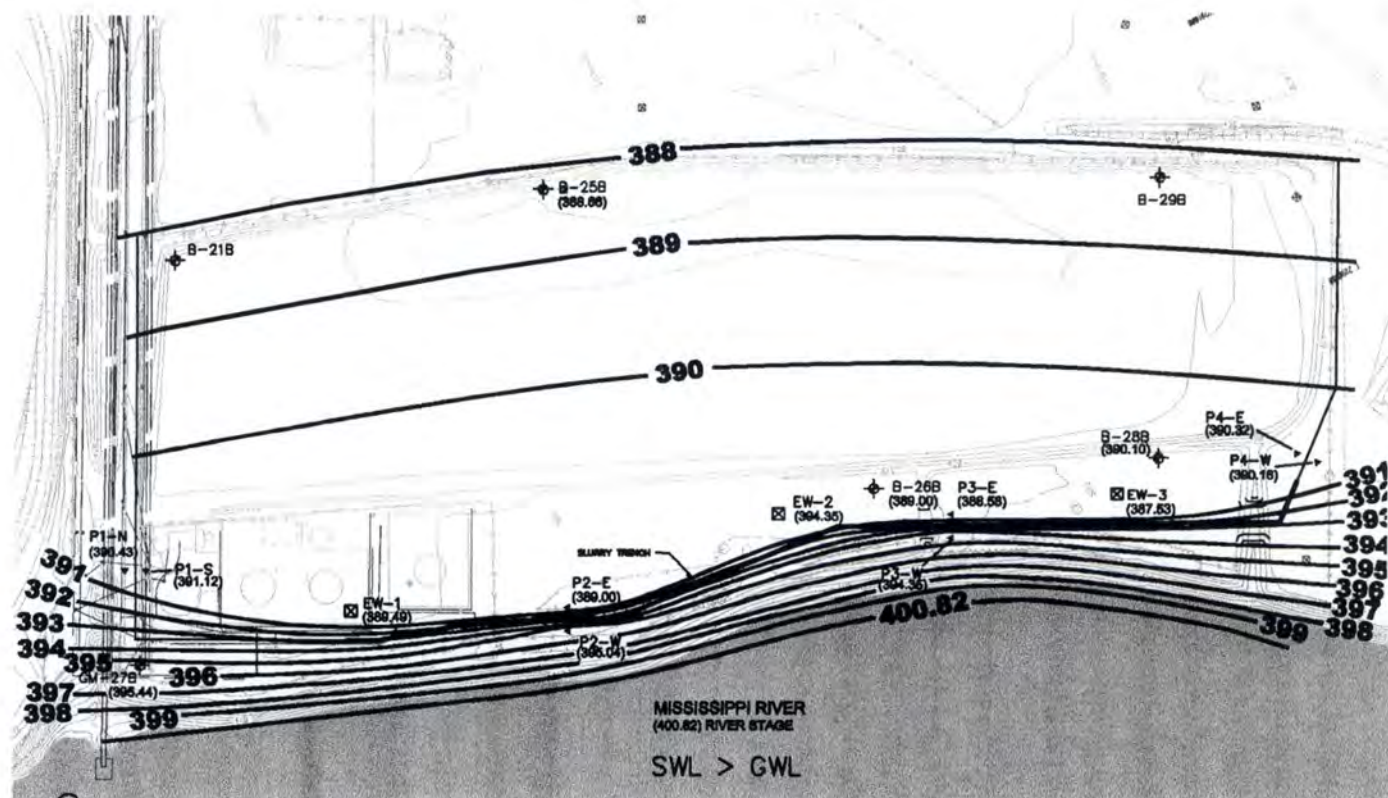
— HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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		Groundwater Elevation March 10, 2004	FIG. NO. 20



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

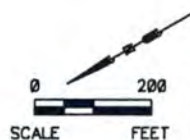
— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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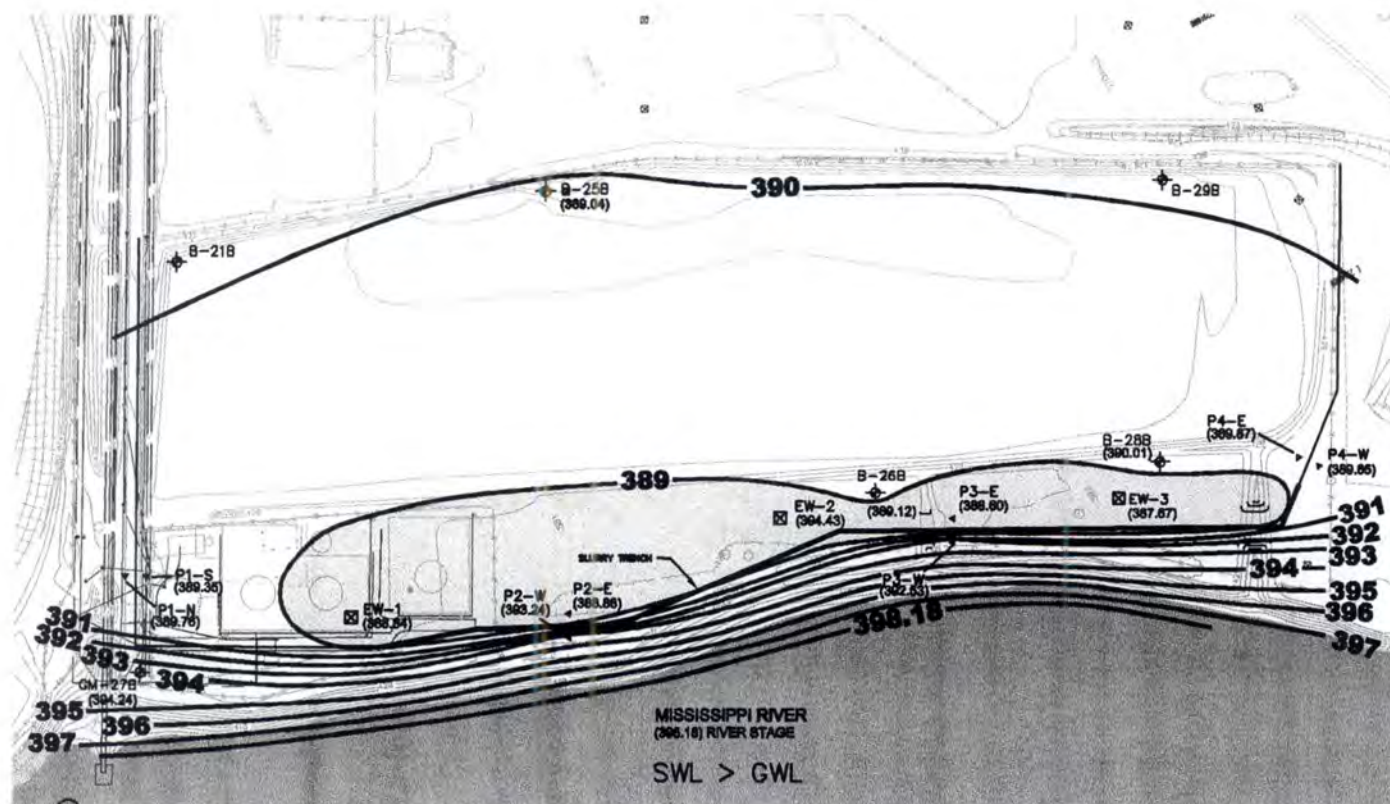
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 11, 2004

PROJECT NO.

FIG. NO.

21



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

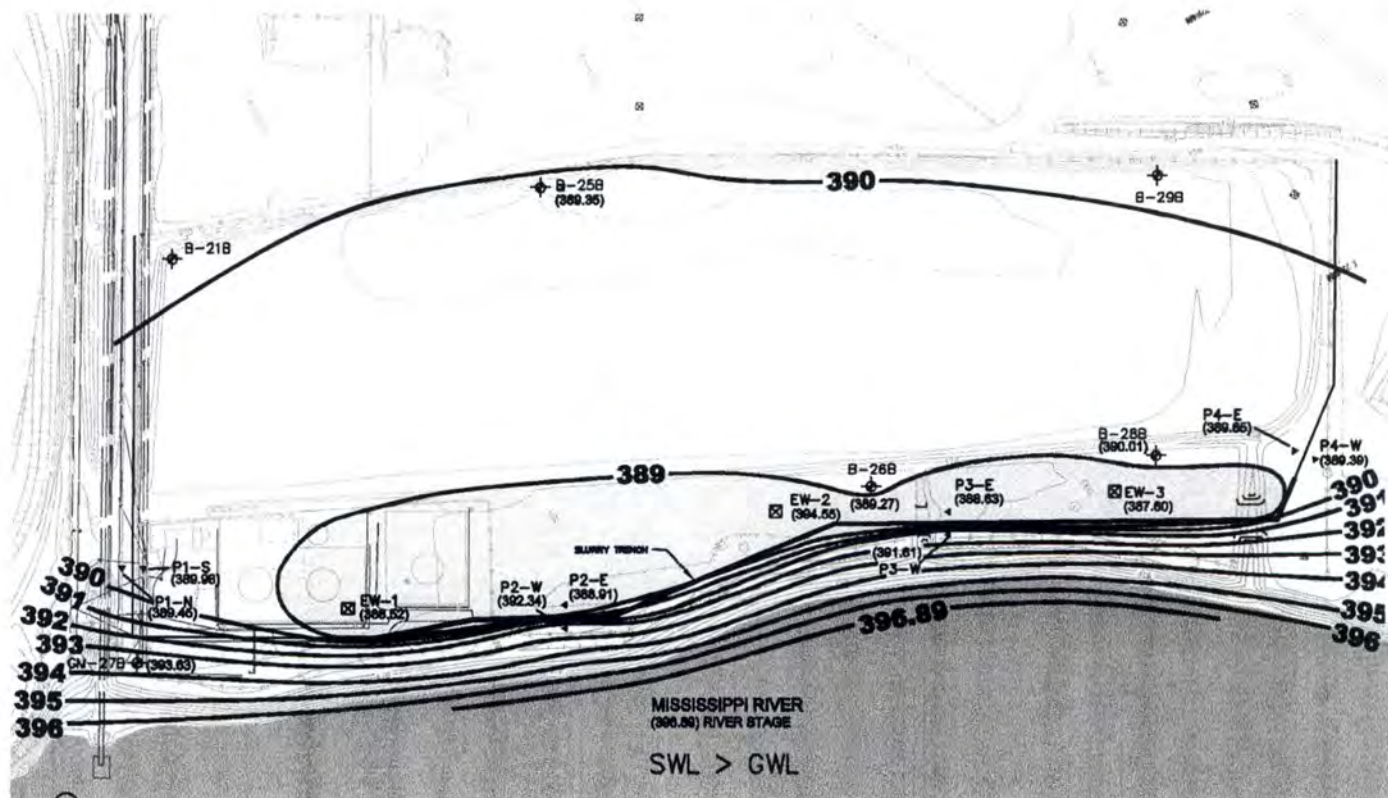
GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation March 12, 2004	FIG. NO. 22



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION

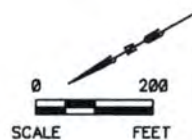
— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

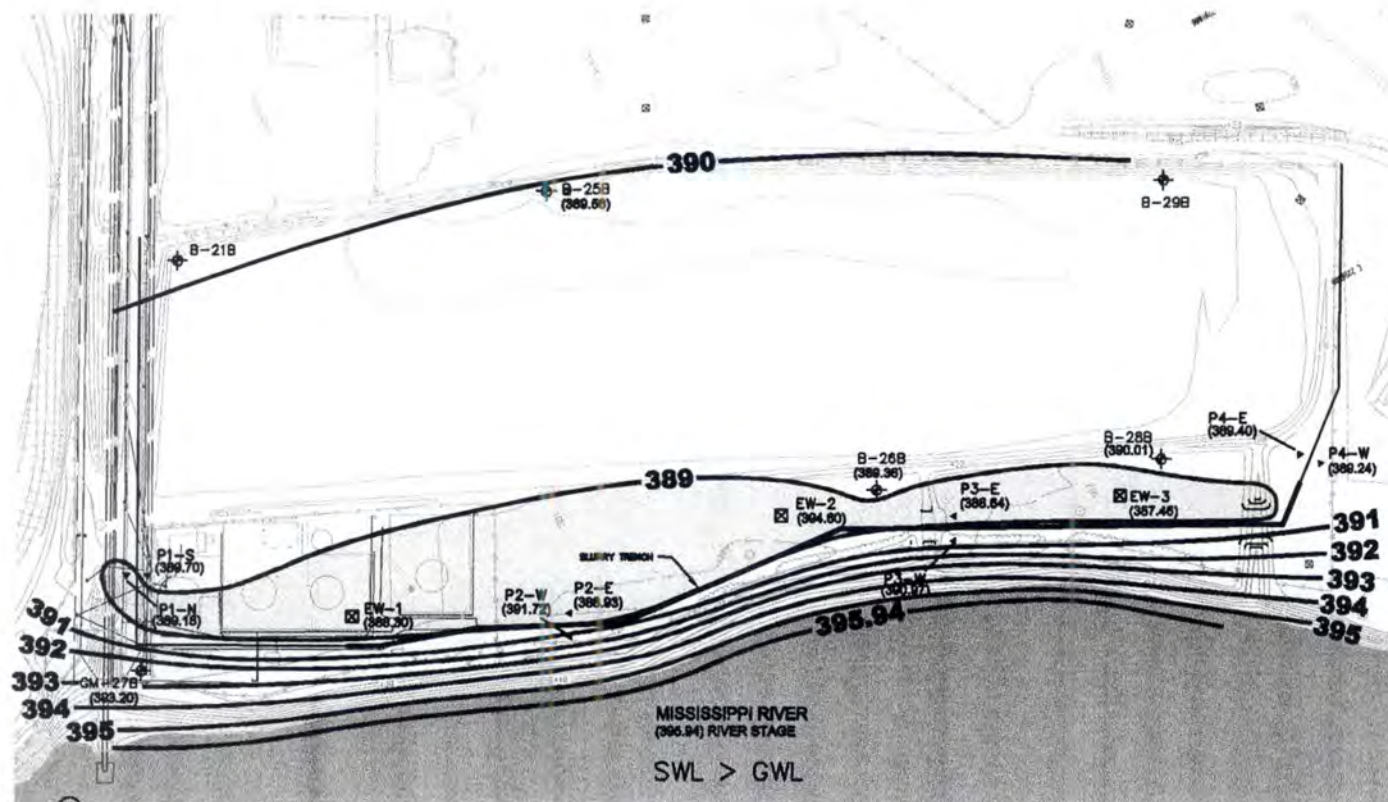
GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation March 13, 2004	FIG. NO. 23



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION

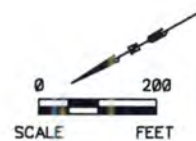
— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

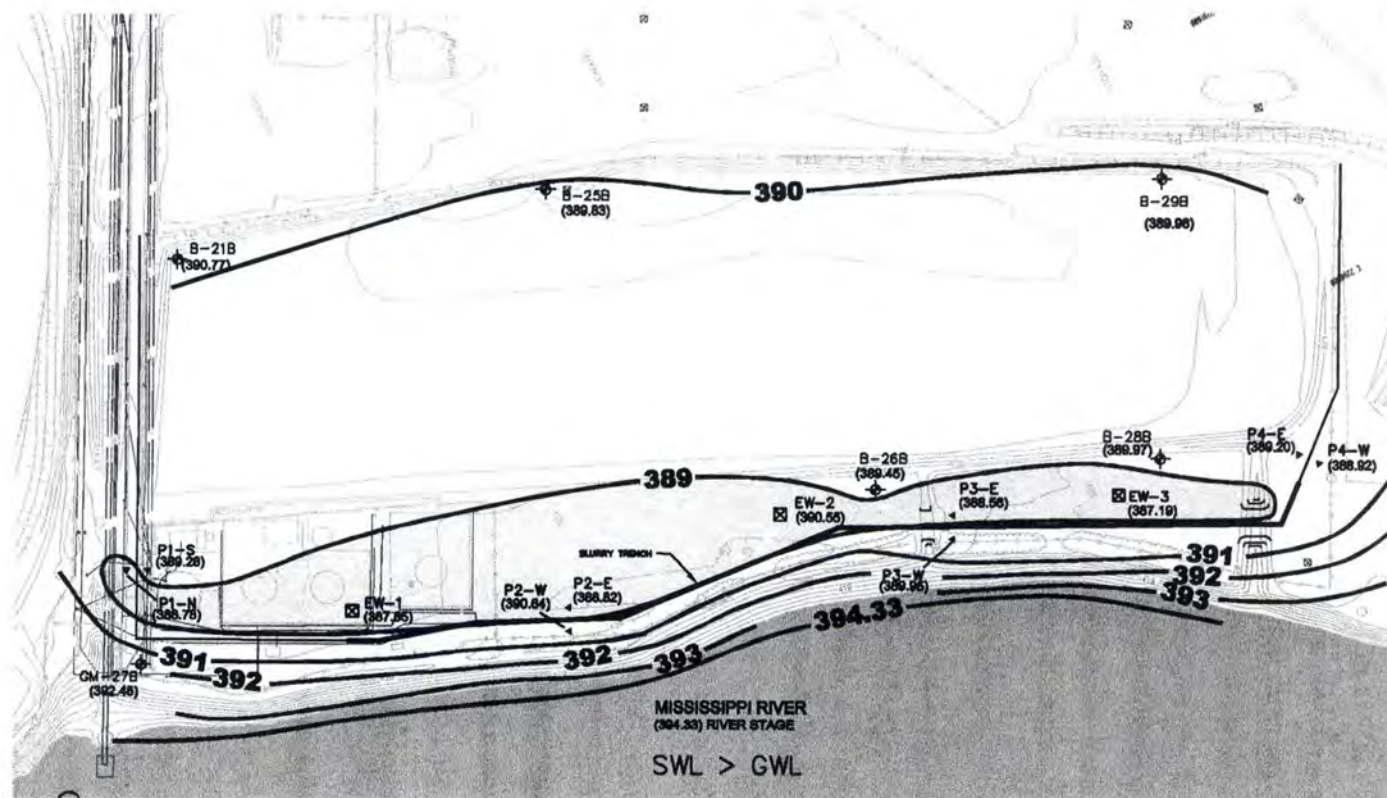
— HYDRAULIC TROUGH

SWL > GWL

GW = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



 SOLUTIA TM Applied Chemistry, Creative Solutions	GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
	Groundwater Elevation March 14, 2004	FIG. NO. 24



LEGEND

-379- GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

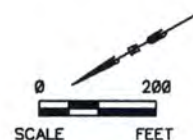
— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

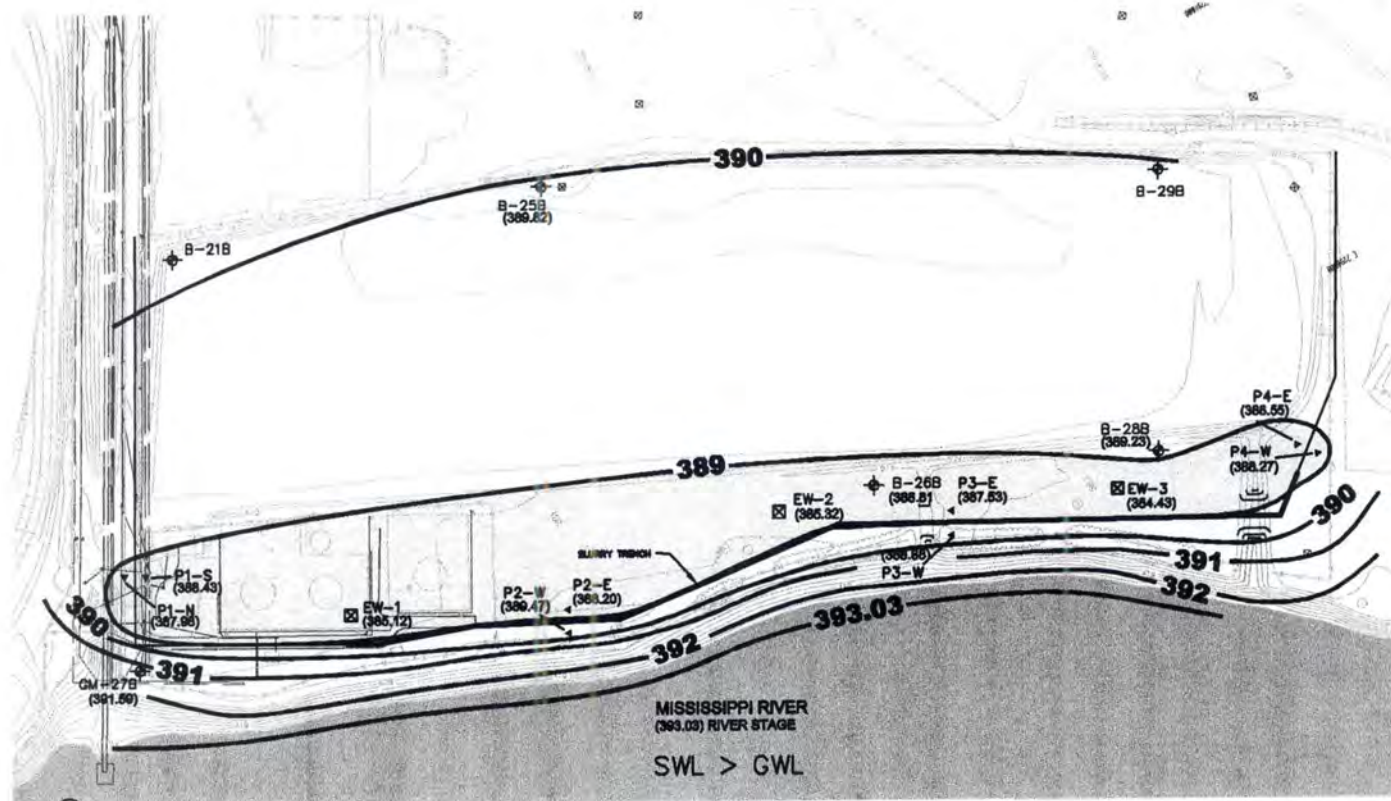
— HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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	Groundwater Elevation March 15, 2004	FIG. NO. 25



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

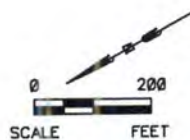
— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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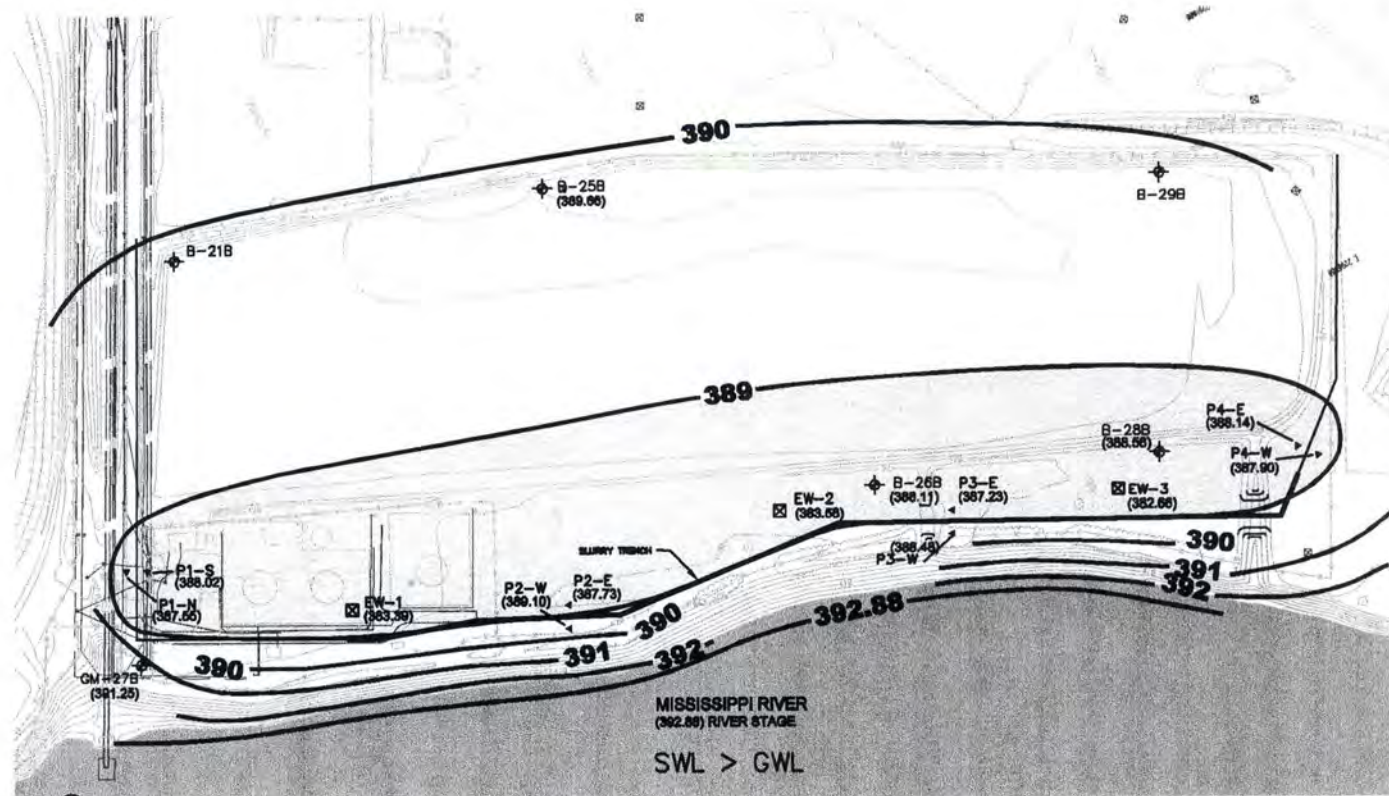
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 16, 2004

PROJECT NO.

FIG. NO.

26



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION

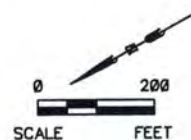
— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



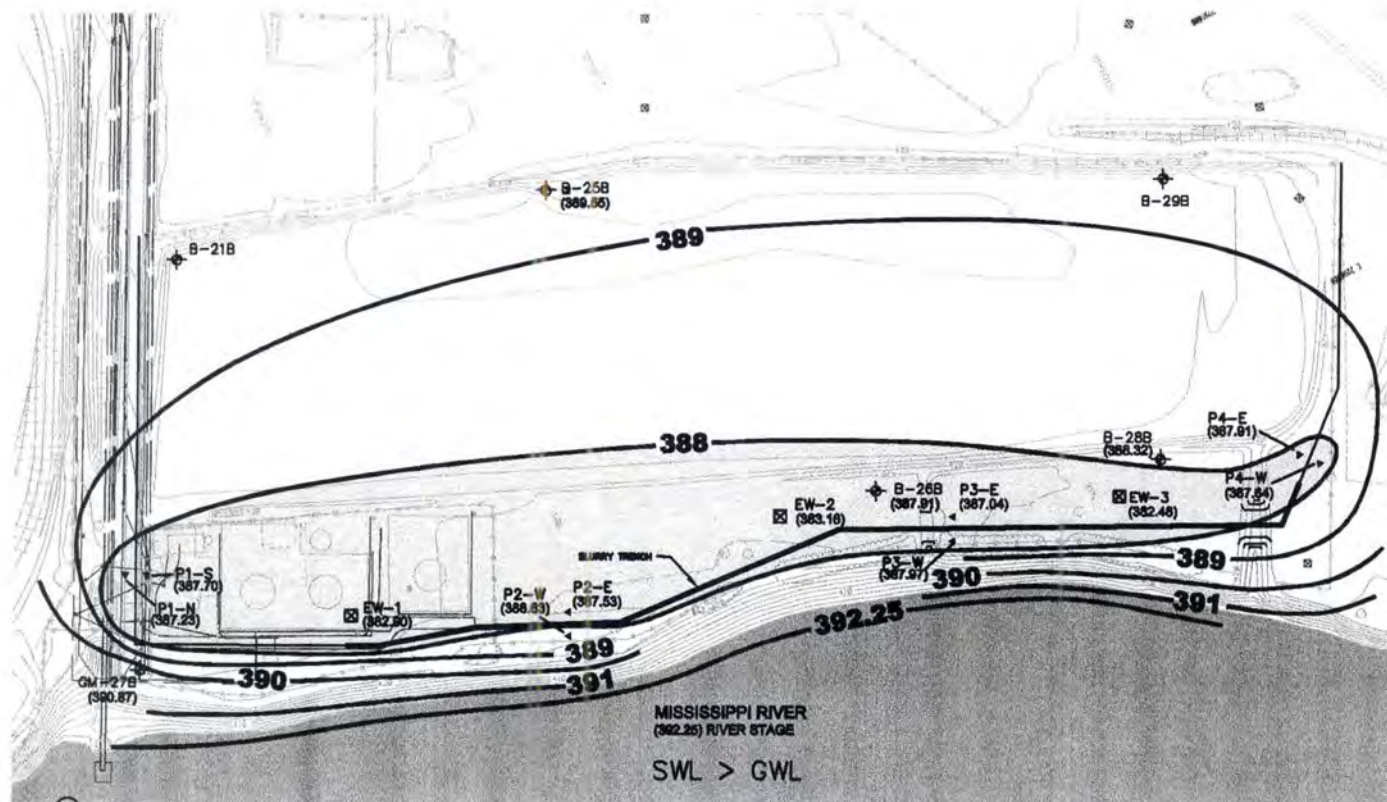
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GROUNDWATER MIGRATION CONTROL SYSTEM
 SITE-R
 SAUGET, ILLINOIS

Groundwater Elevation
 March 17, 2004

PROJECT NO.
 FIG. NO.
 27



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION

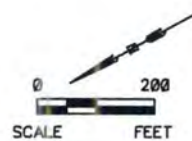
— COMPLETED SLURRY TRENCH


— TRENCH WALL ALIGNMENT

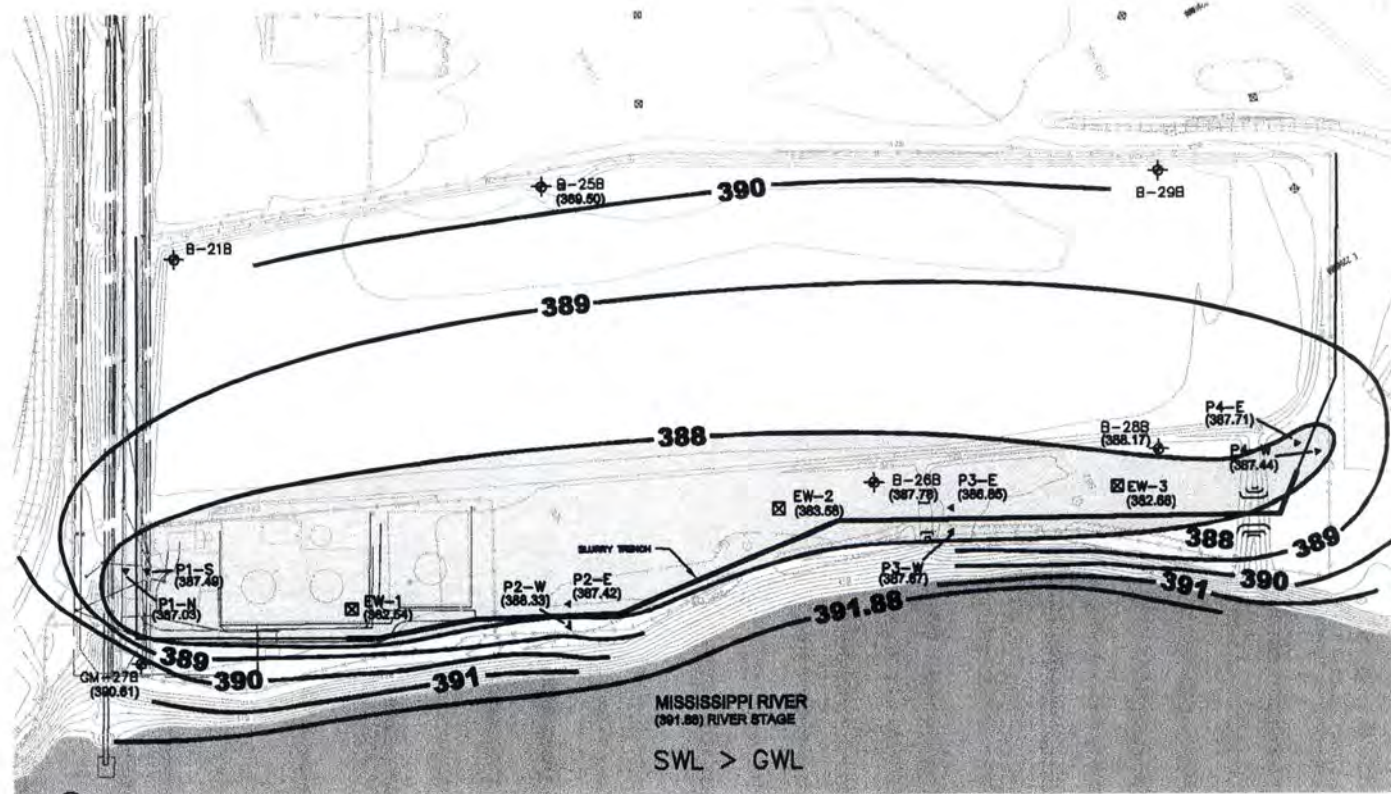
— HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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	Groundwater Elevation March 18, 2004	FIG. NO. 28



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION

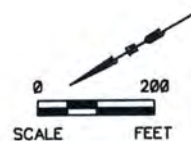
— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

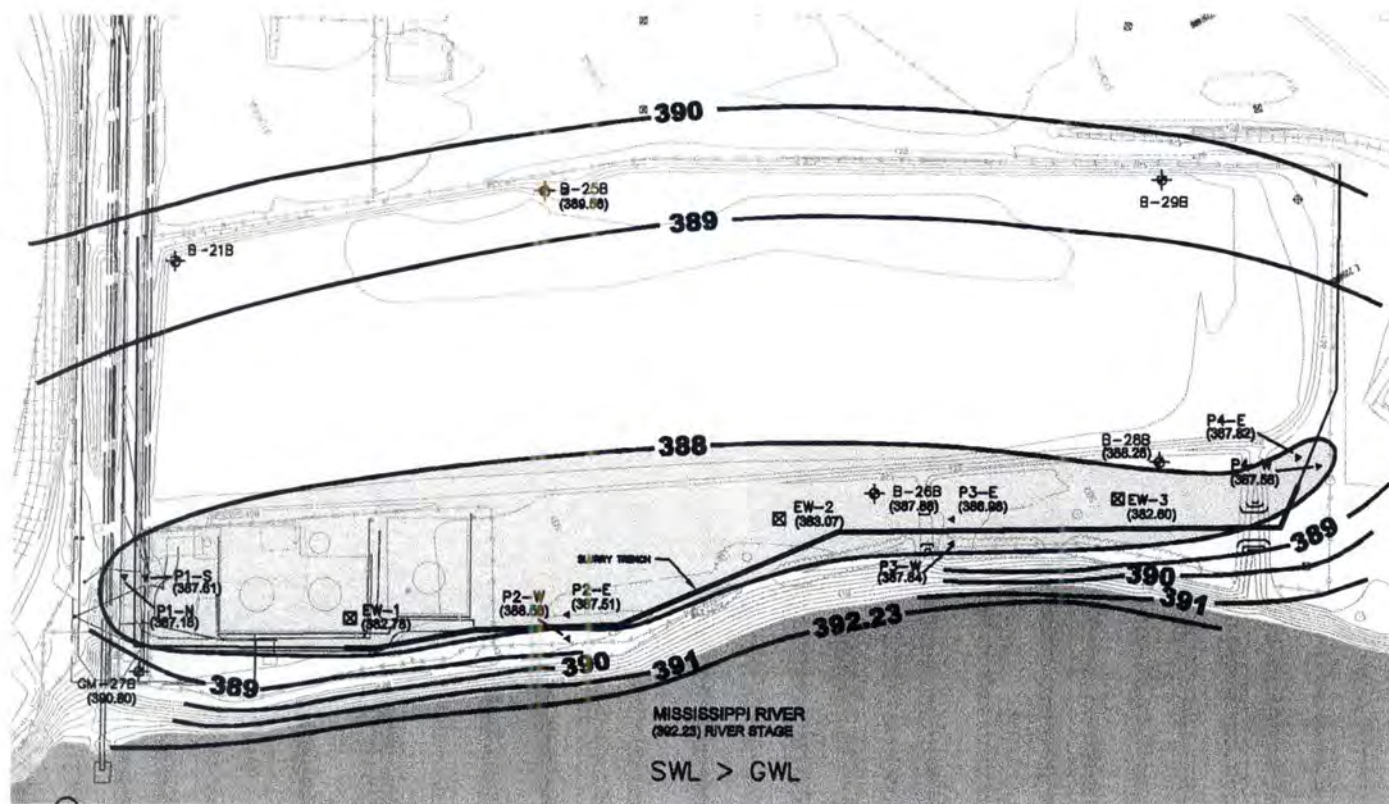
SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation March 19, 2004	FIG. NO. 29

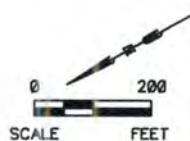


LEGEND

- 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
- (379) GROUNDWATER ELEVATION
- COMPLETED SLURRY TRENCH
- TRENCH WALL ALIGNMENT
- HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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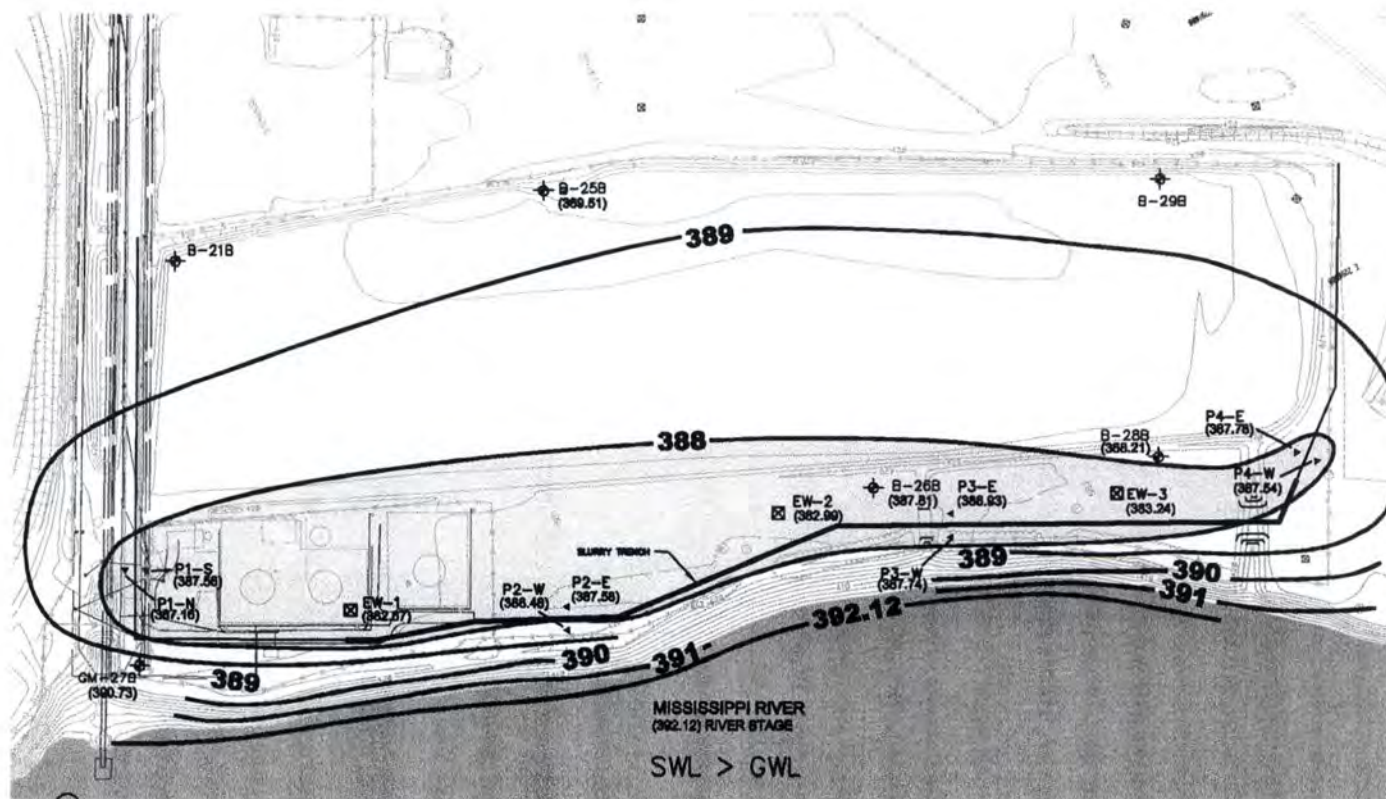
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 20, 2004

PROJECT NO.

FIG. NO.

30



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

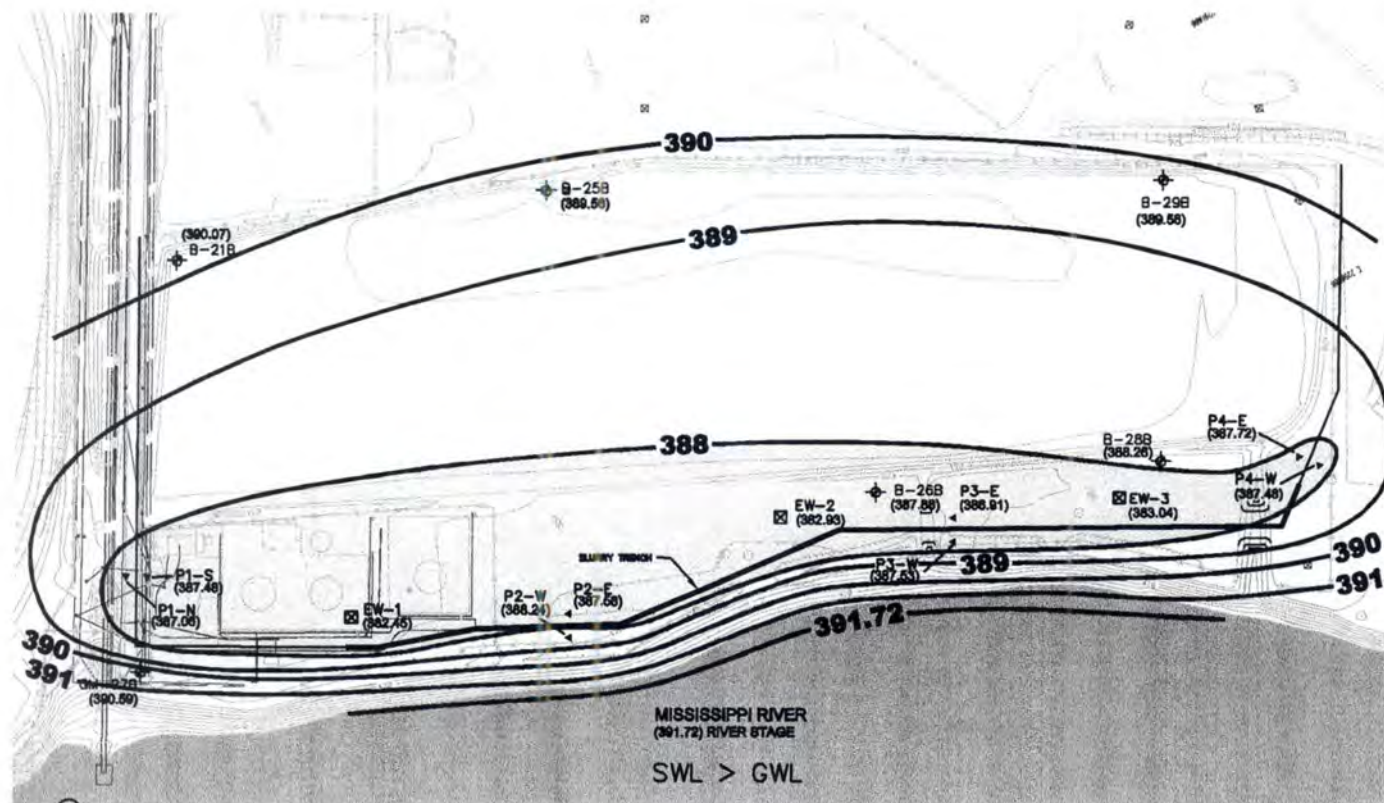
GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation March 21, 2004	FIG. NO. 31



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

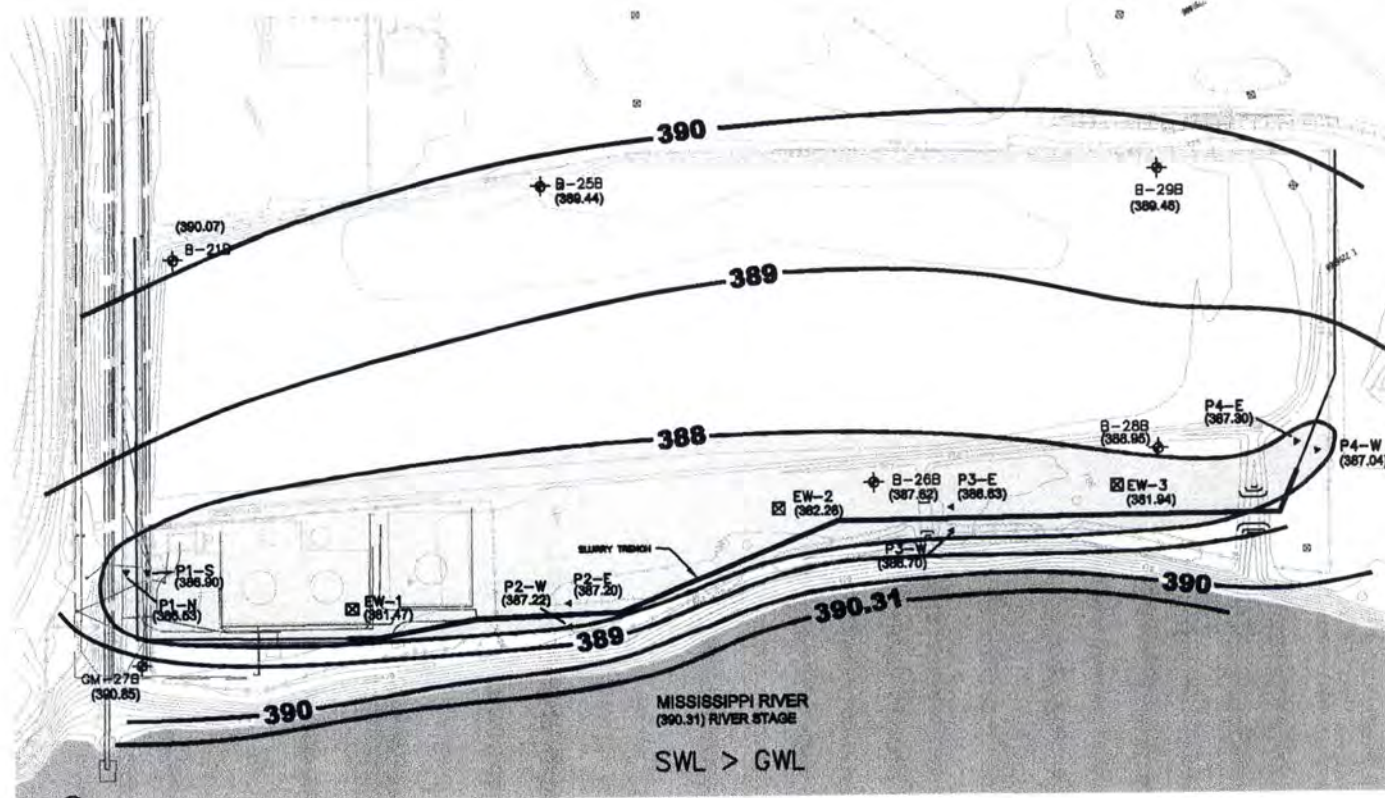
GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation March 22, 2004	FIG. NO. 32



LEGEND

-379- GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

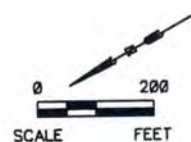
COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

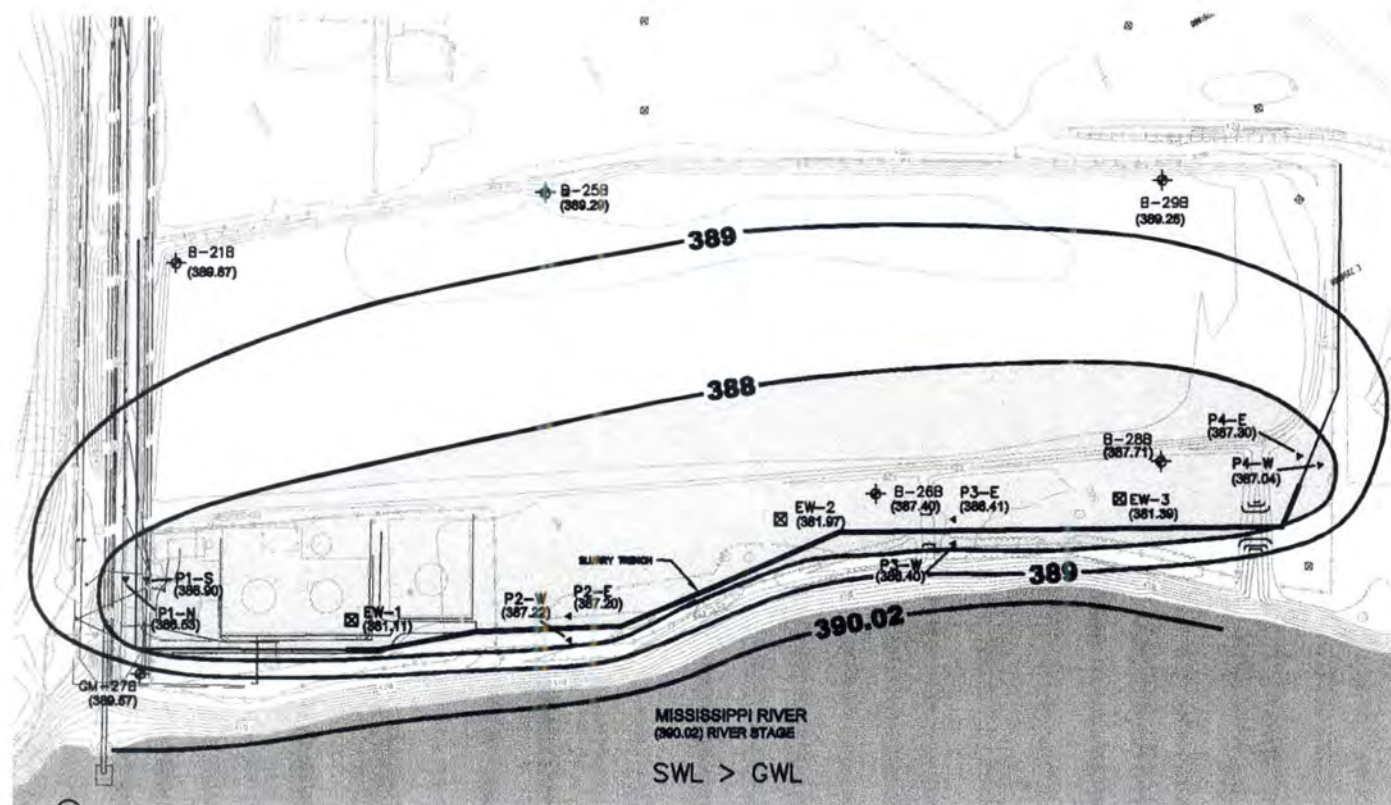
HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



<p>SOLUTIA INC. 575 MARYVILLE CENTRE DRIVE ST. LOUIS, MO. 63141 Applied Chemistry, Creative Solutions</p>	GROUNDWATER MIGRATION CONTROL SYSTEM		PROJECT NO.
	SITE-R SAUGET, ILLINOIS		FIG. NO.
	Groundwater Elevation March 23, 2004		33



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH
— TRENCH WALL ALIGNMENT
— HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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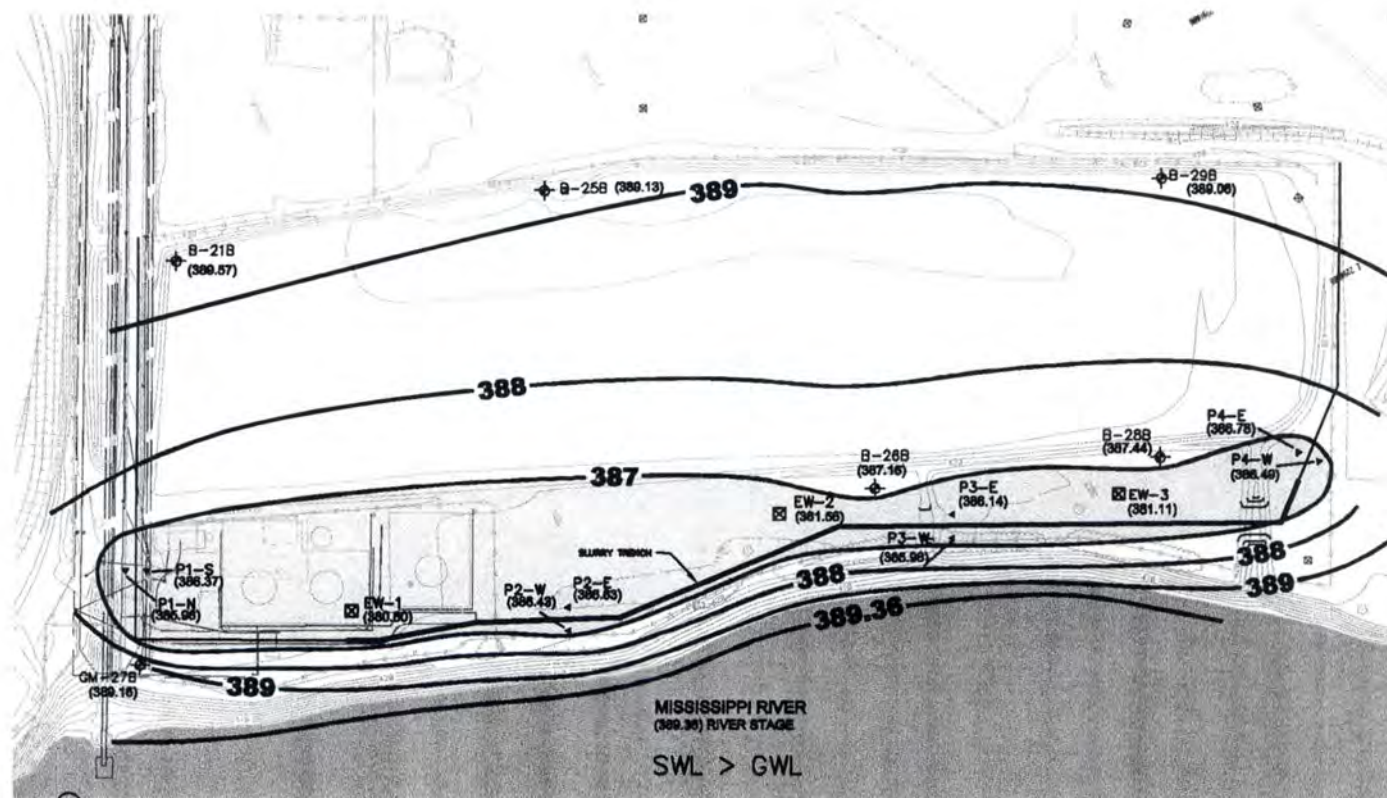
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGEY, ILLINOIS

Groundwater Elevation
March 24, 2004

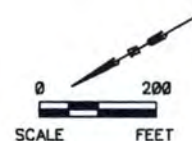
PROJECT NO.


FIG. NO.

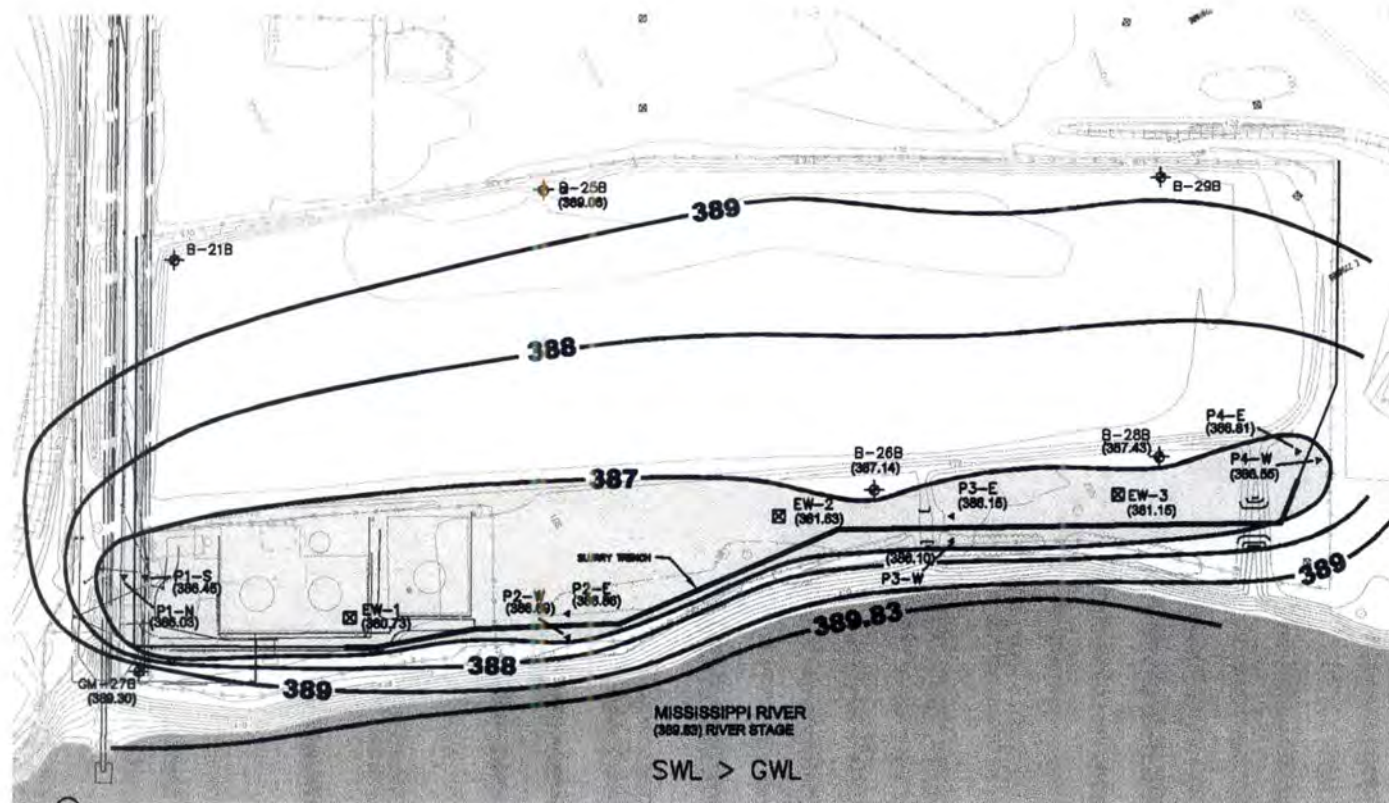
34



- LEGEND**
- 379—** GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 - (379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL**
 - GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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		Groundwater Elevation March 25, 2004	FIG. NO. 35



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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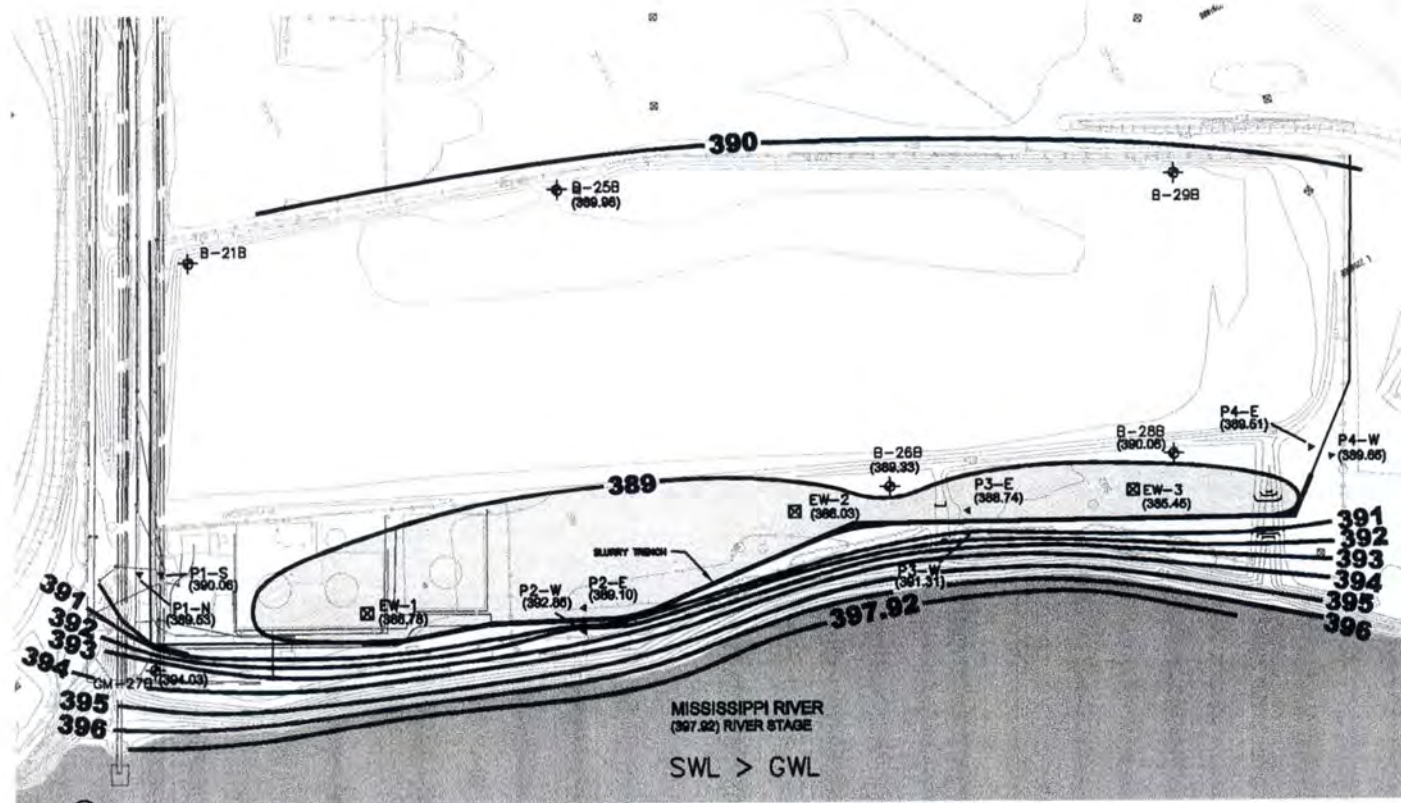
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 26, 2004

PROJECT NO.

FIG. NO.

36



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

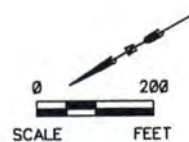
— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

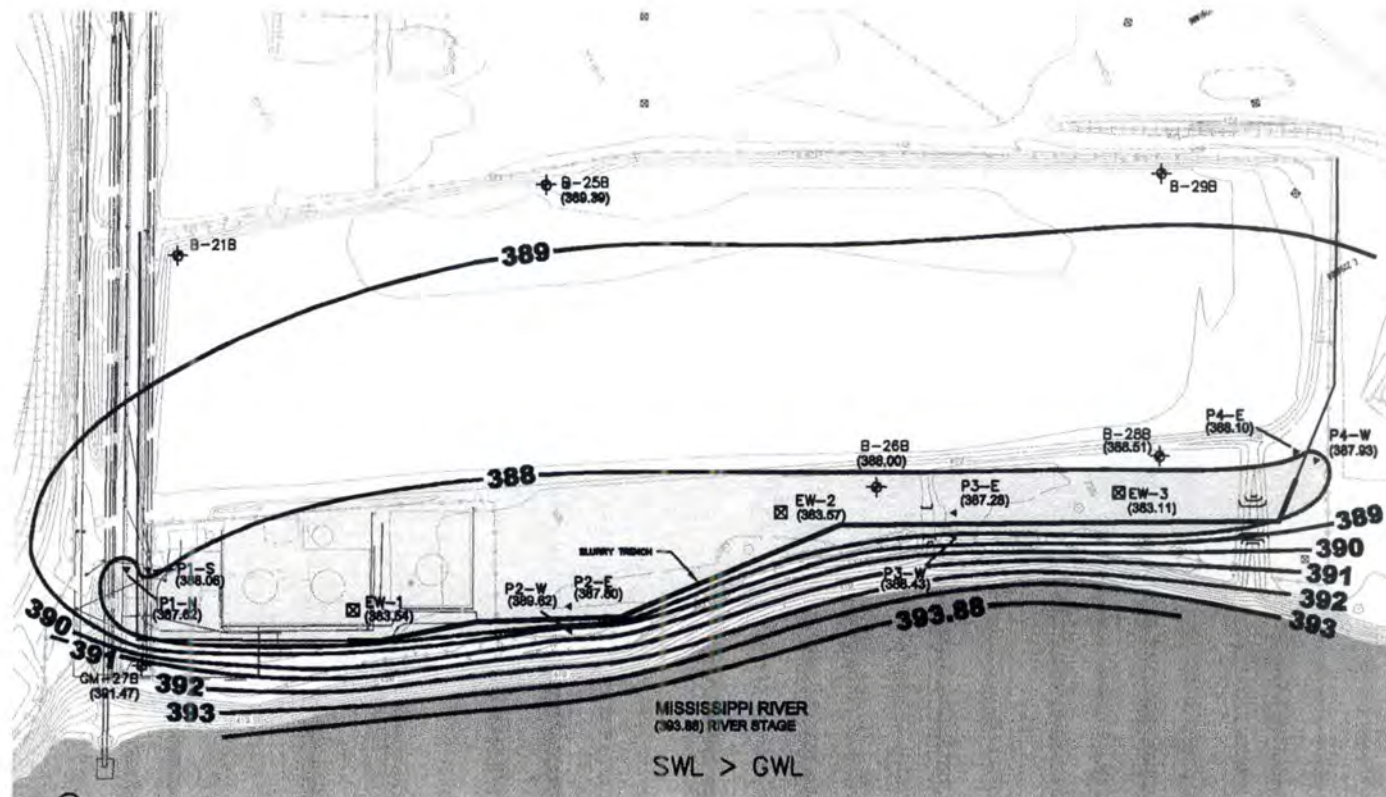
GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



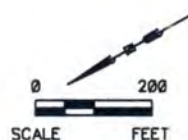
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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation March 28, 2004	FIG. NO. 38



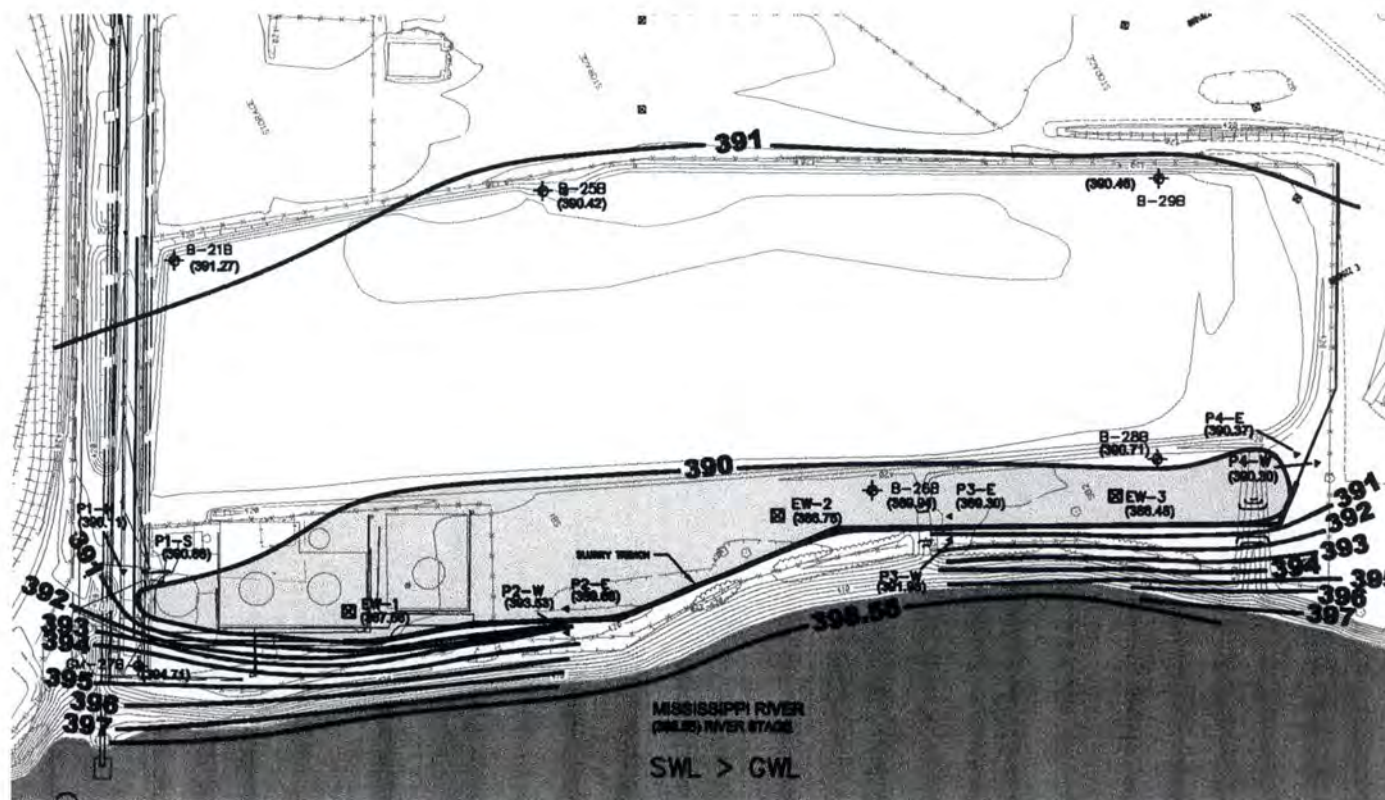
- LEGEND**
- 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 - (379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL
 - GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



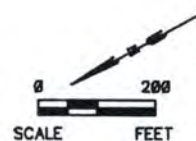
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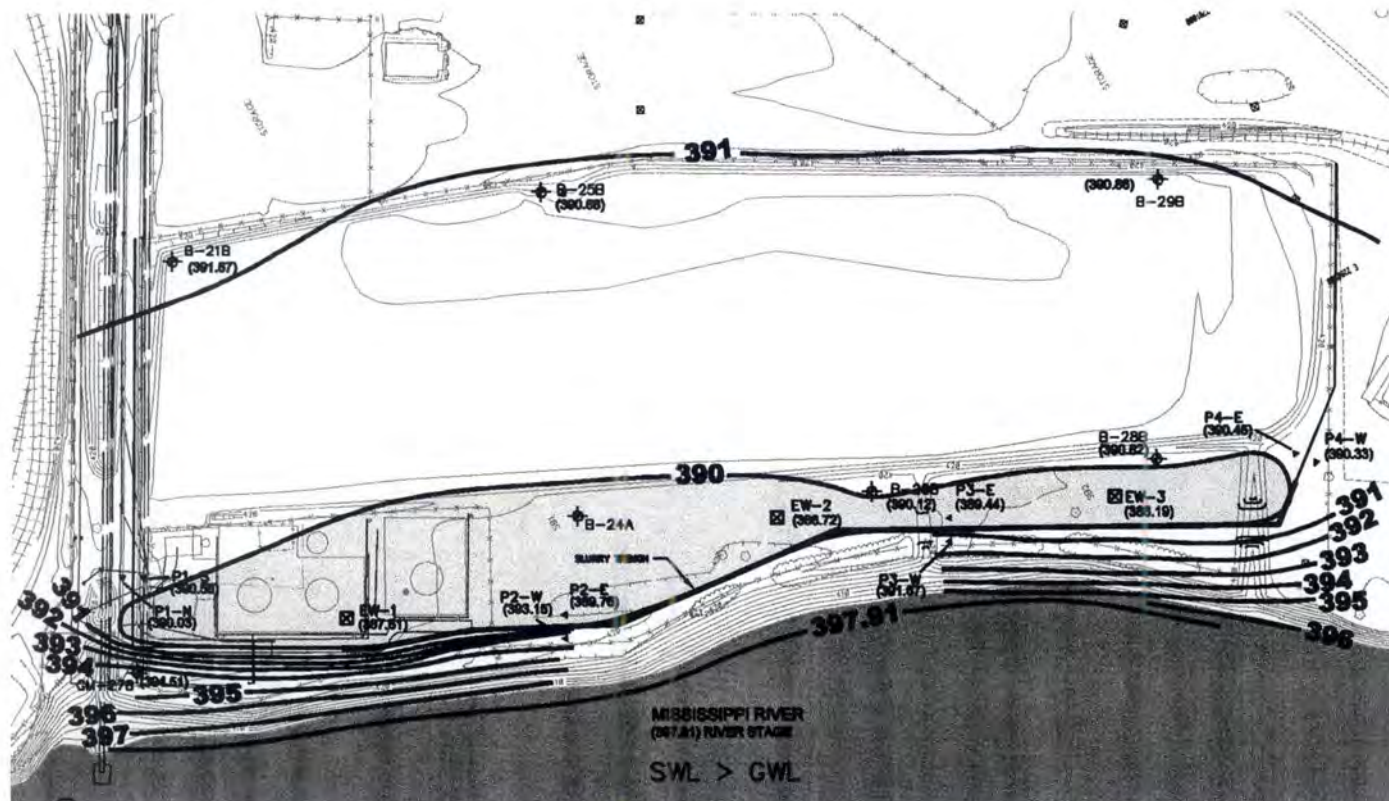
GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation March 27, 2004	FIG. NO. 37



- LEGEND**
- 379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 - (379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL
 - GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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	<p>Groundwater Elevation March 29, 2004</p>	<p>FIG. NO. 39</p>



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

— SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



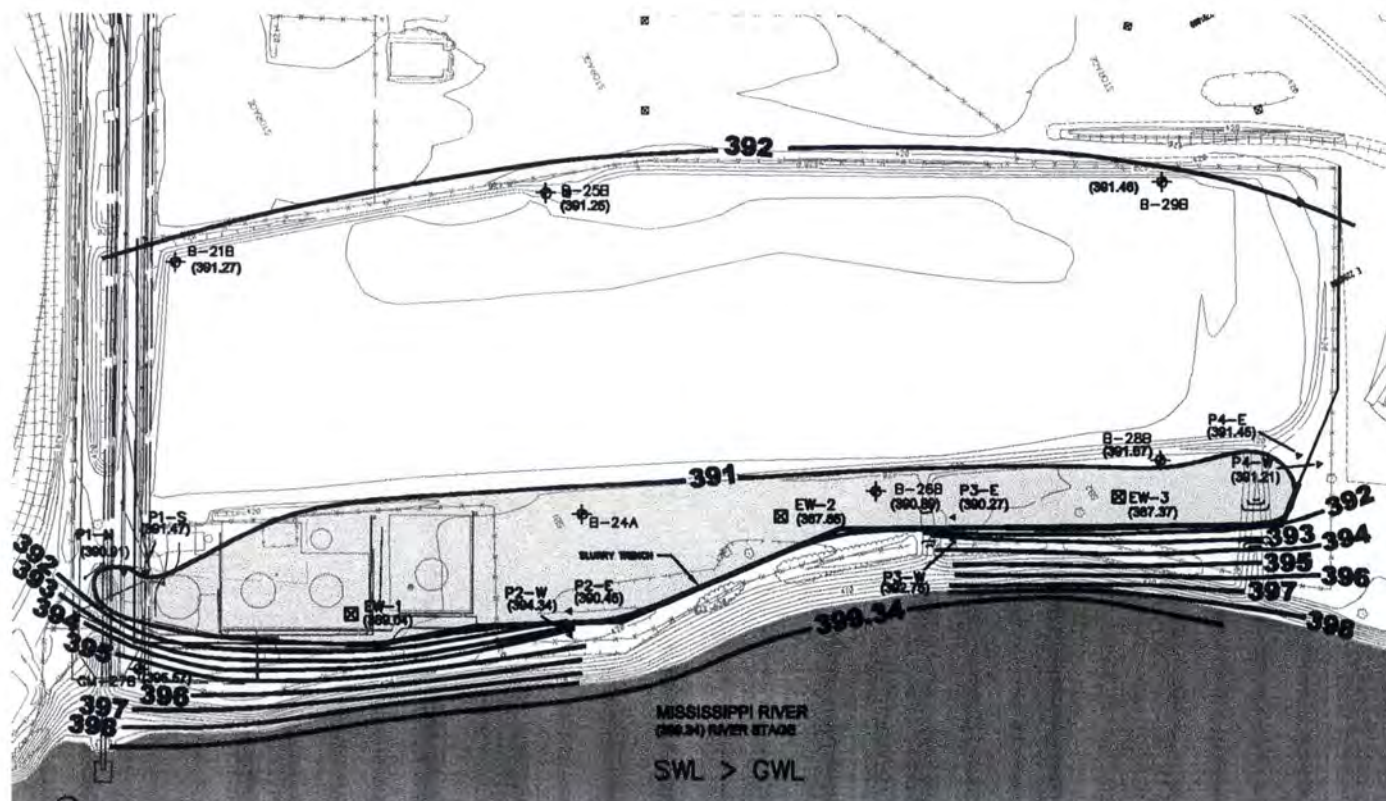
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GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 30, 2004

PROJECT NO.
FIG. NO.
40



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



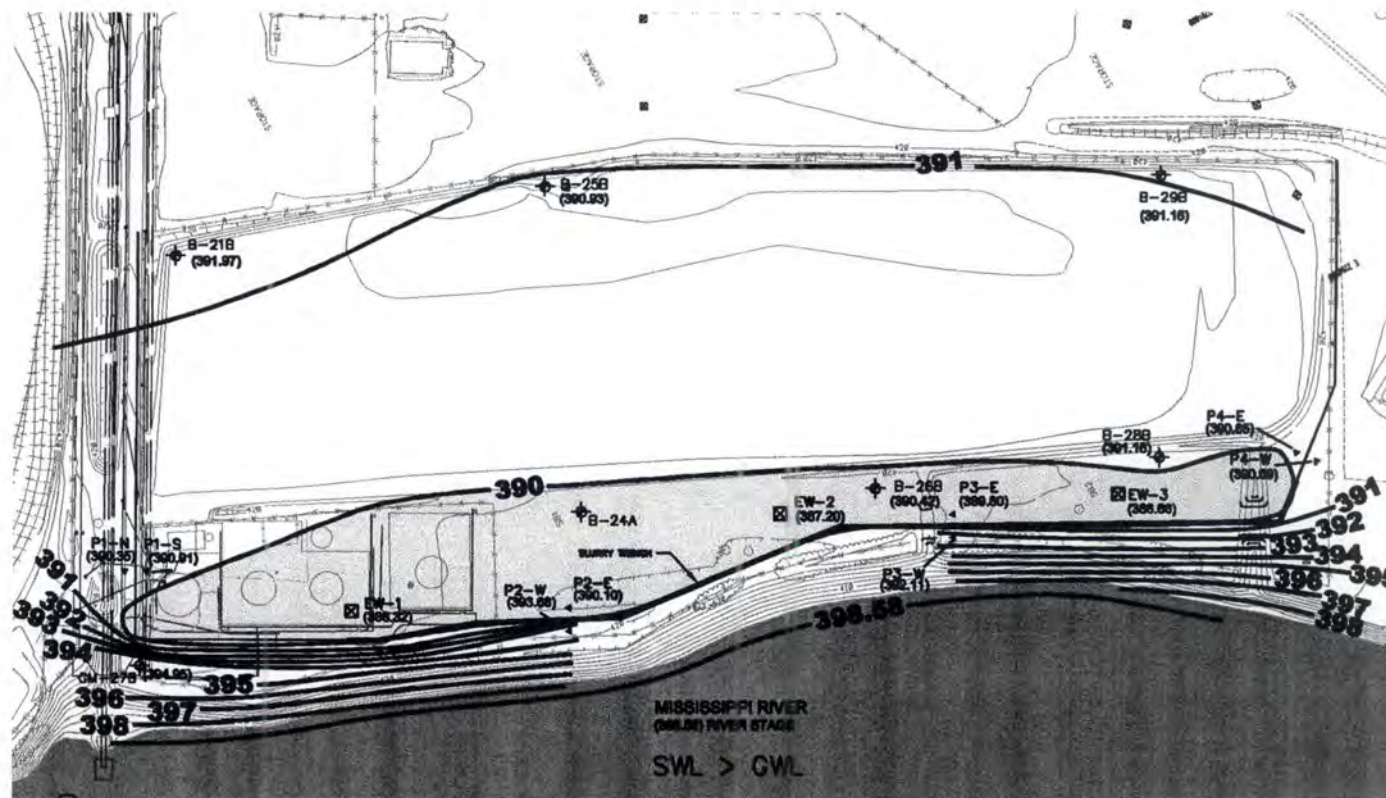
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SITE-R
SAUGET, ILLINOIS

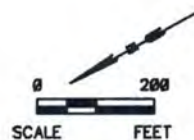
Groundwater Elevation
April 01, 2004

PROJECT NO.

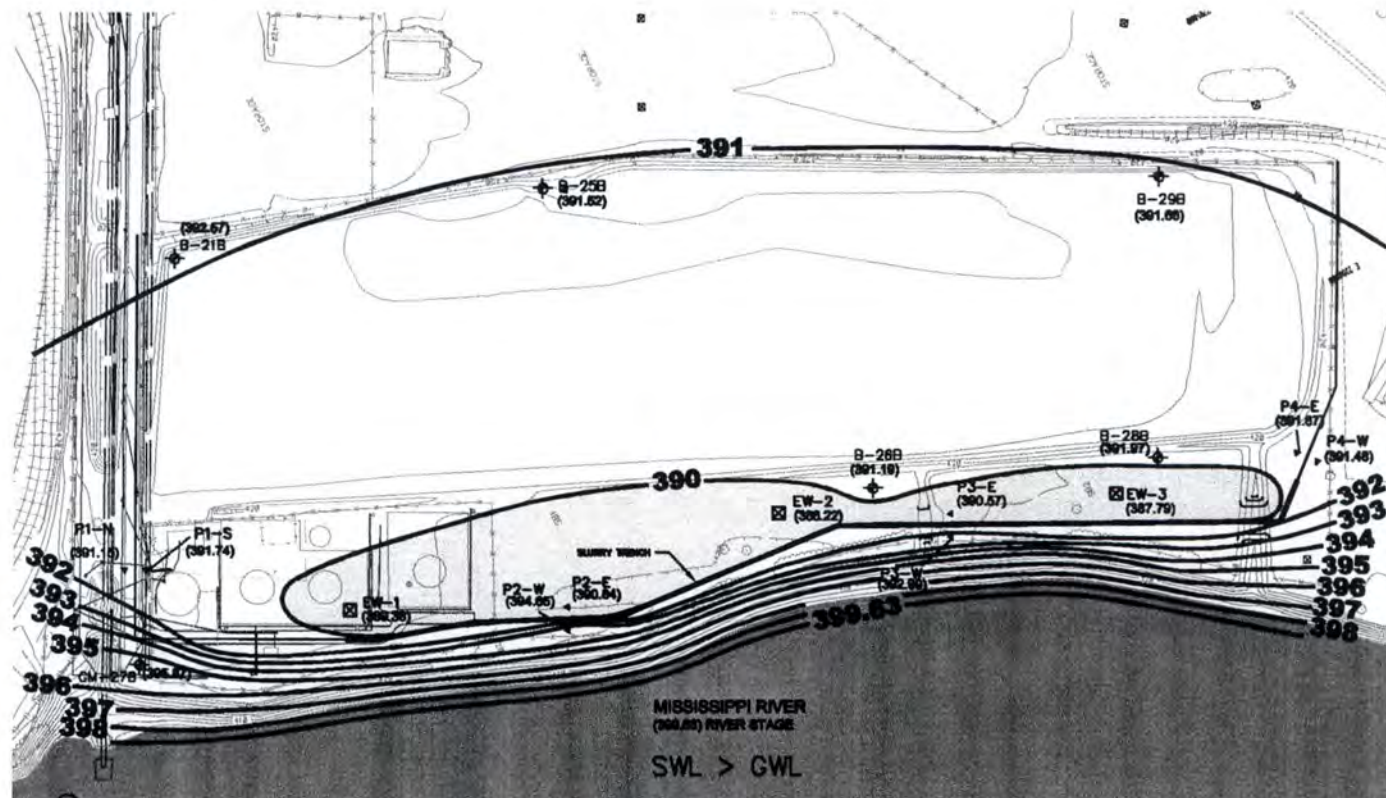
FIG. NO.
42



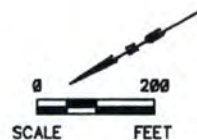
- LEGEND**
- 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 - (379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL
 - GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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- LEGEND**
- 379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 - (379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL
 - GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

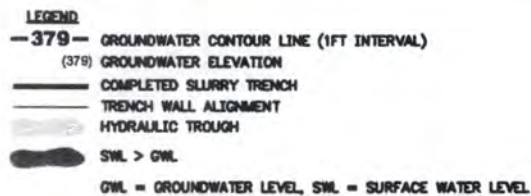


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GROUNDWATER MIGRATION CONTROL SYSTEM
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Groundwater Elevation
April 02, 2004

PROJECT NO.
FIG. NO.
43

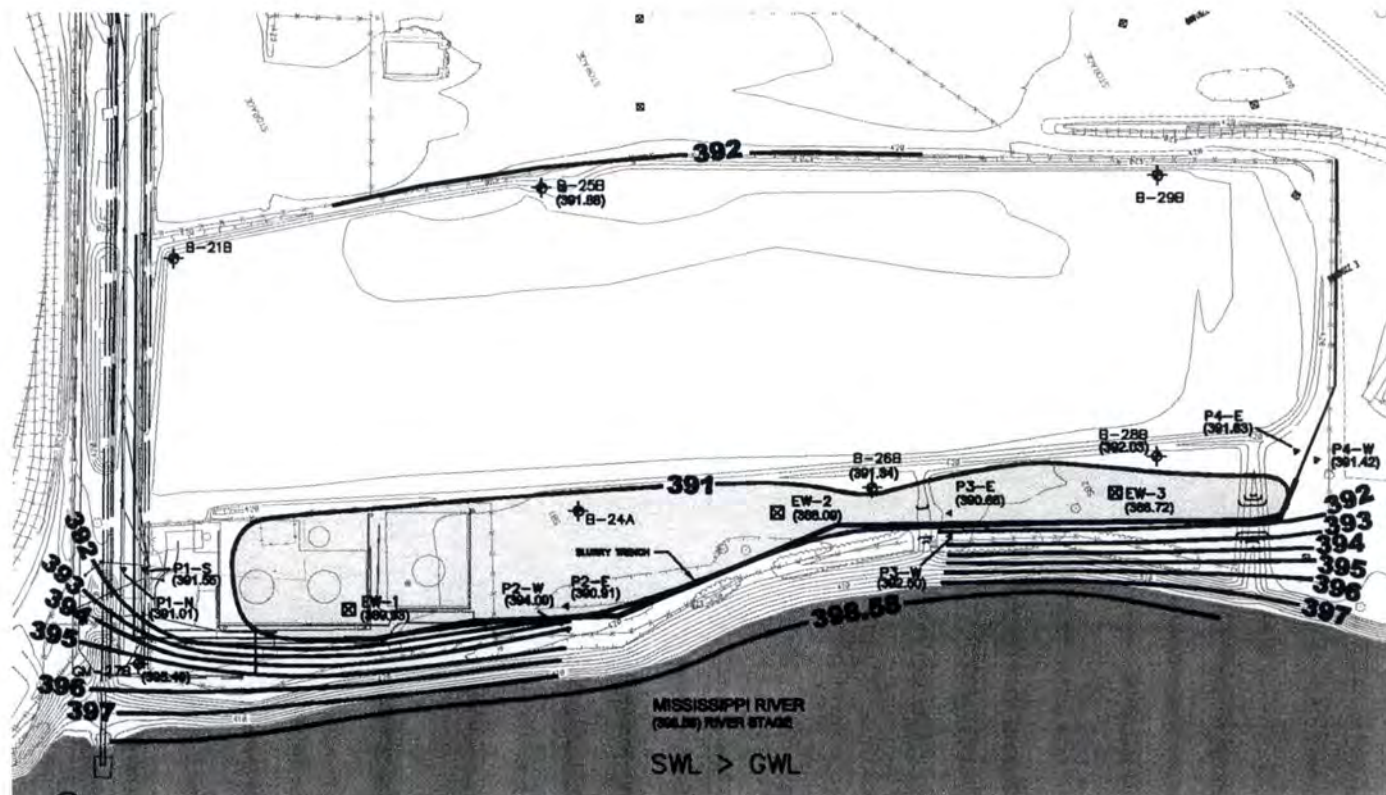


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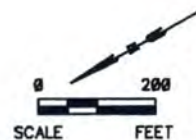
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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	
	Groundwater Elevation April 03, 2004

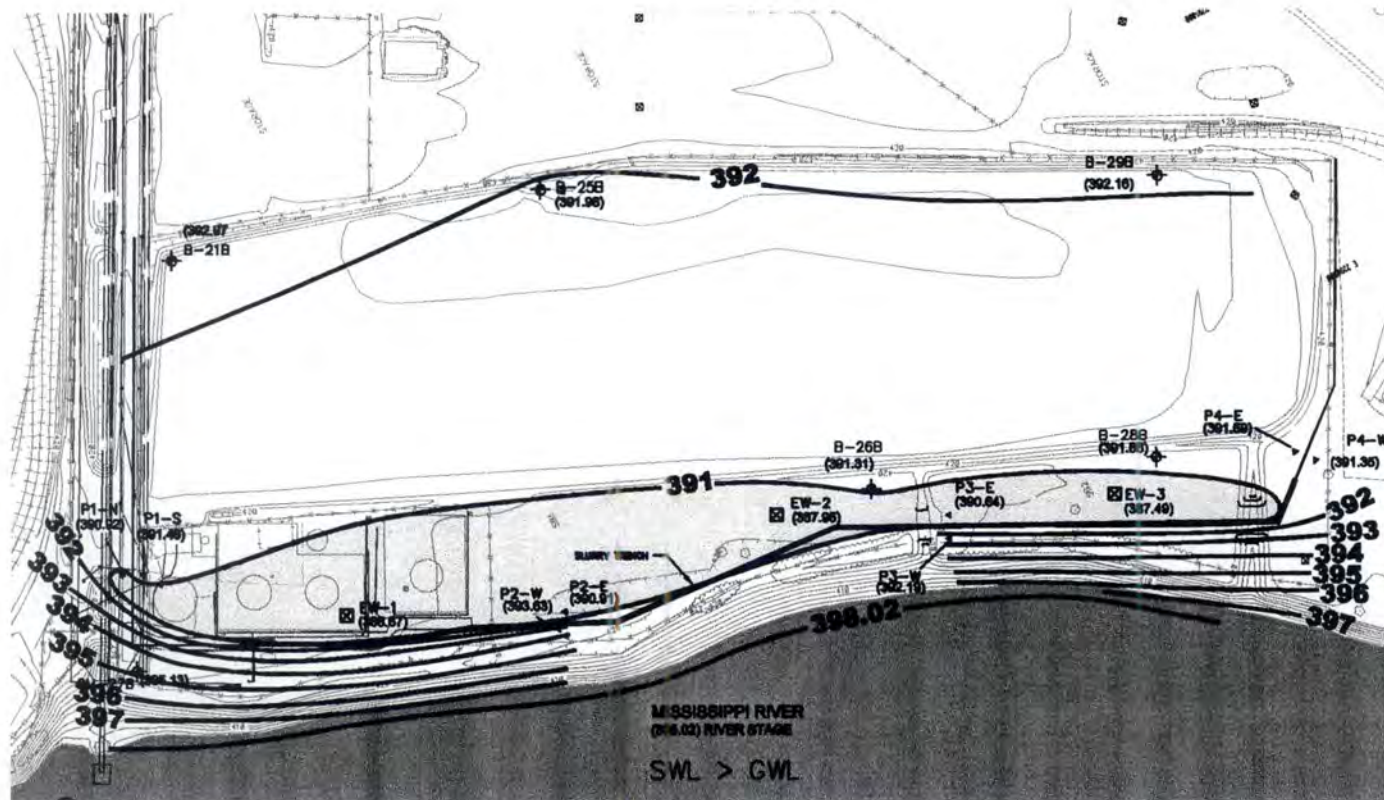
PROJECT NO.	
FIG. NO.	44



- LEGEND**
- 379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 - (379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL
 - GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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	SITE-R SAUGET, ILLINOIS Groundwater Elevation April 04, 2004	FIG. NO. 45



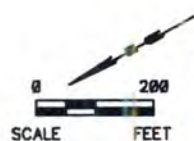
LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH
— TRENCH WALL ALIGNMENT
— HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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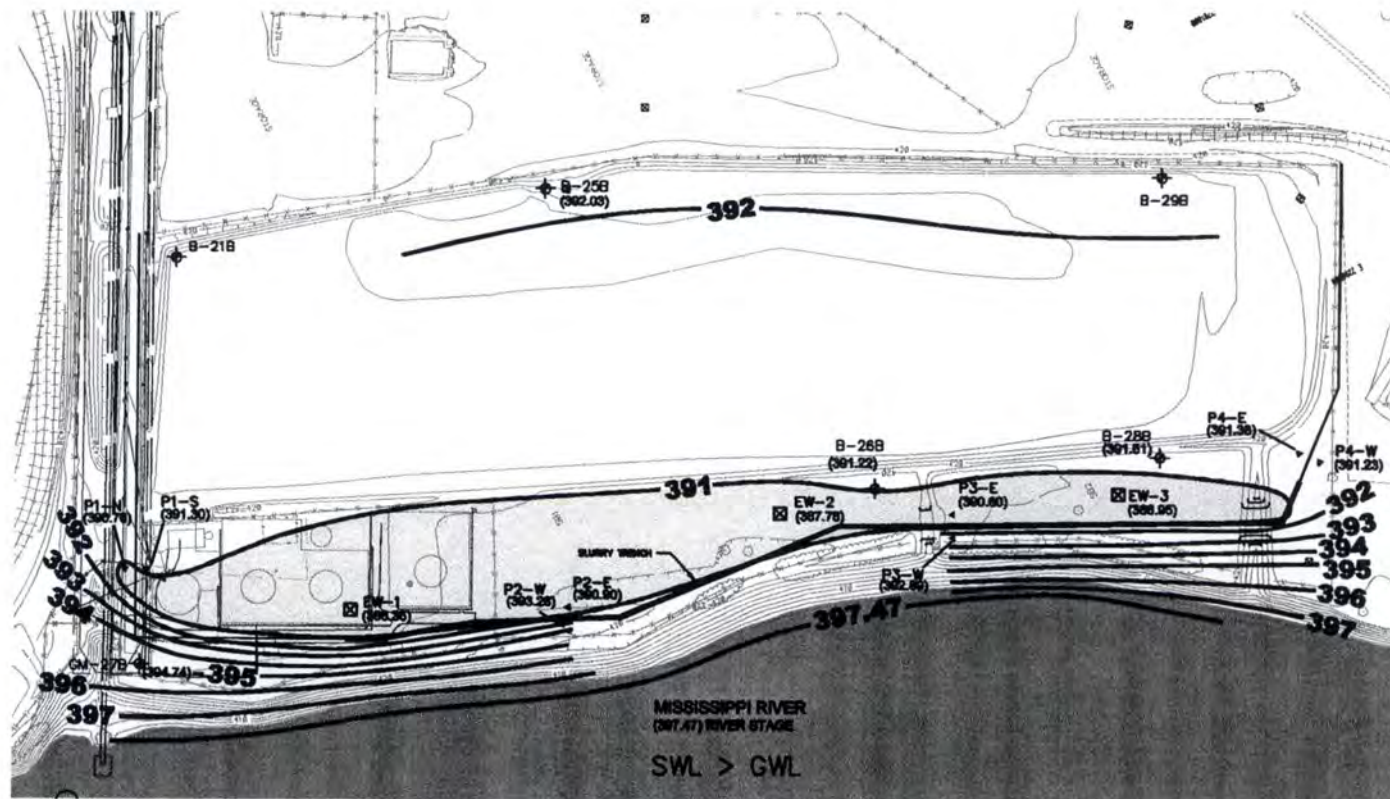
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 05, 2004

PROJECT NO.

FIG. NO.

46



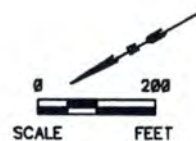
LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH
— TRENCH WALL ALIGNMENT
— HYDRAULIC TROUGH

SWL > GWL

GW = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



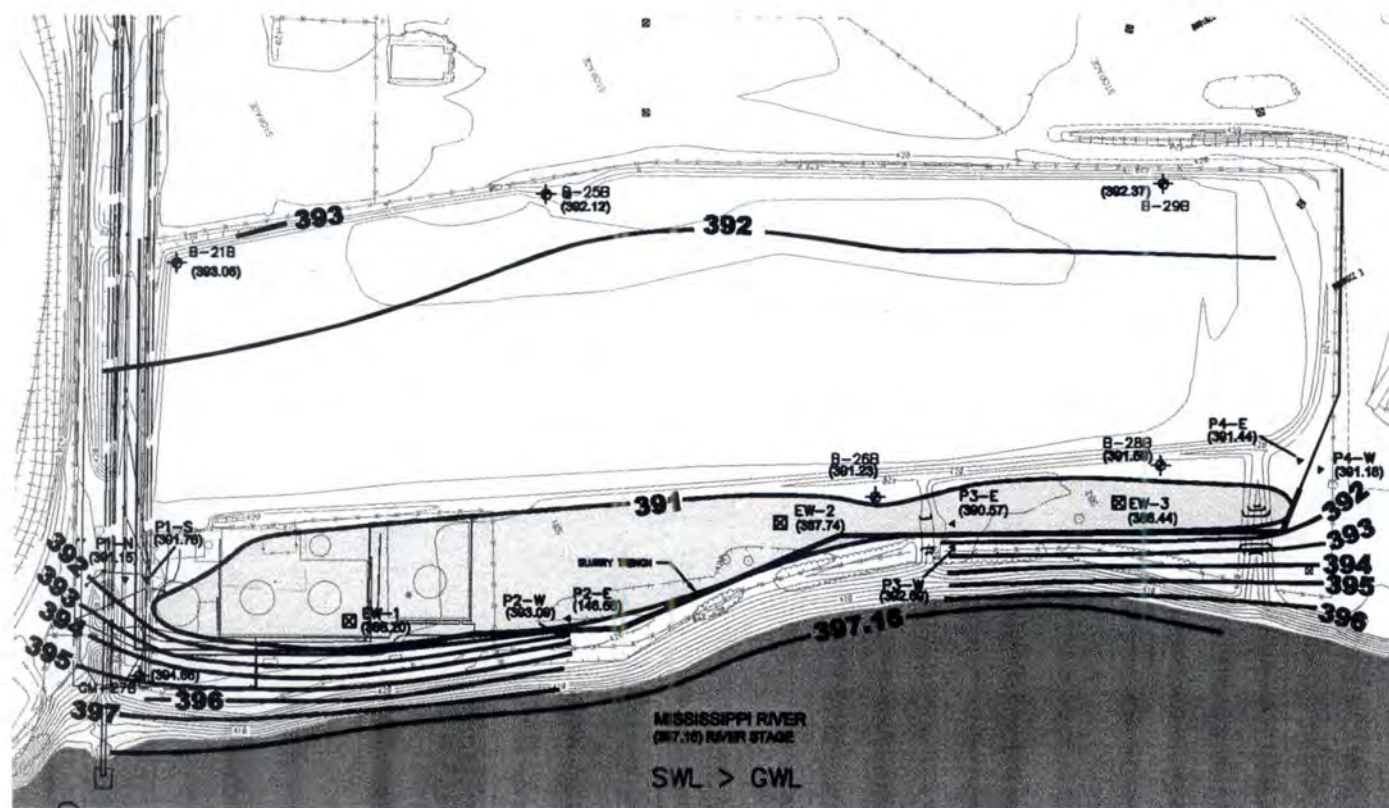
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GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 06, 2004

PROJECT NO.

FIG. NO.
47



LEGEND

— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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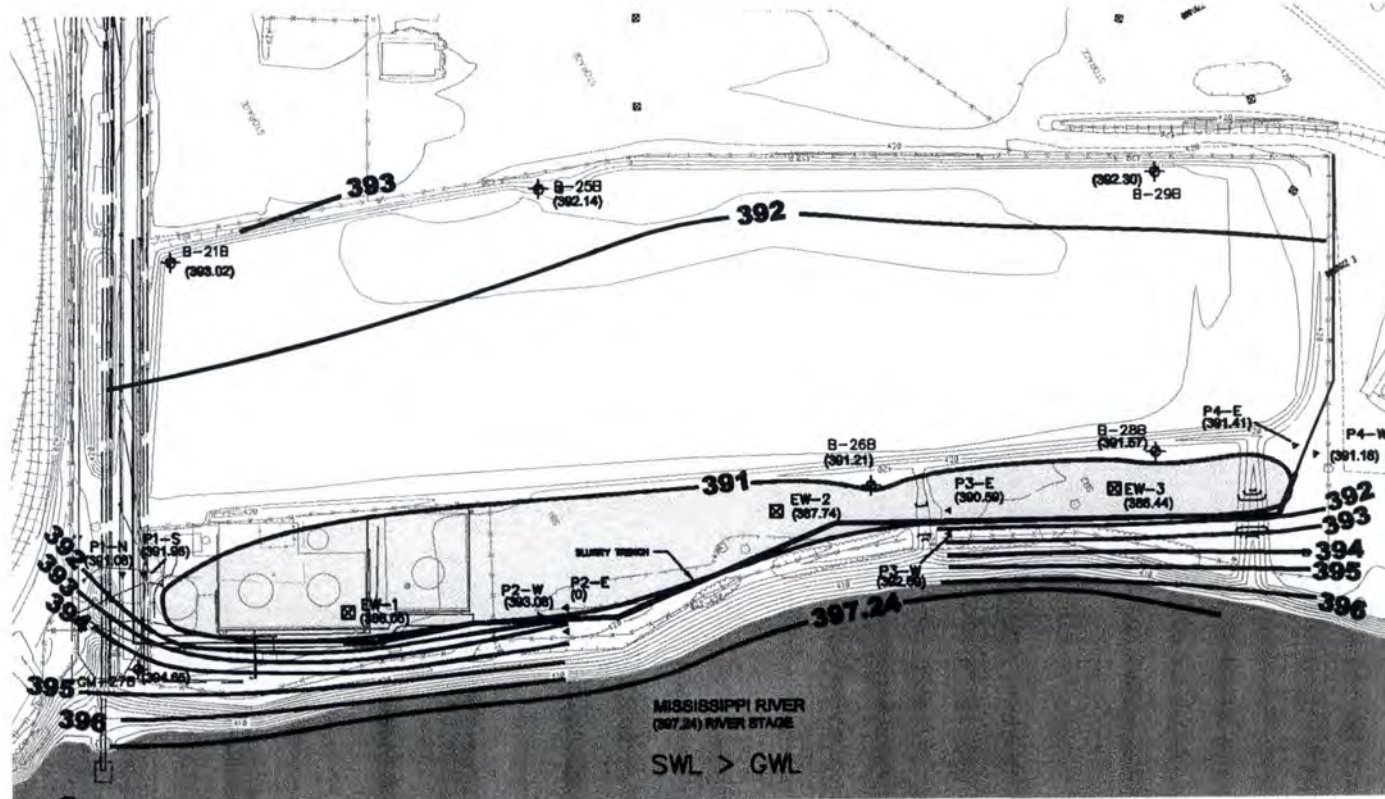
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 07, 2004

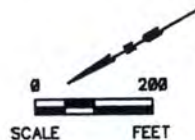
PROJECT NO.


FIG. NO.

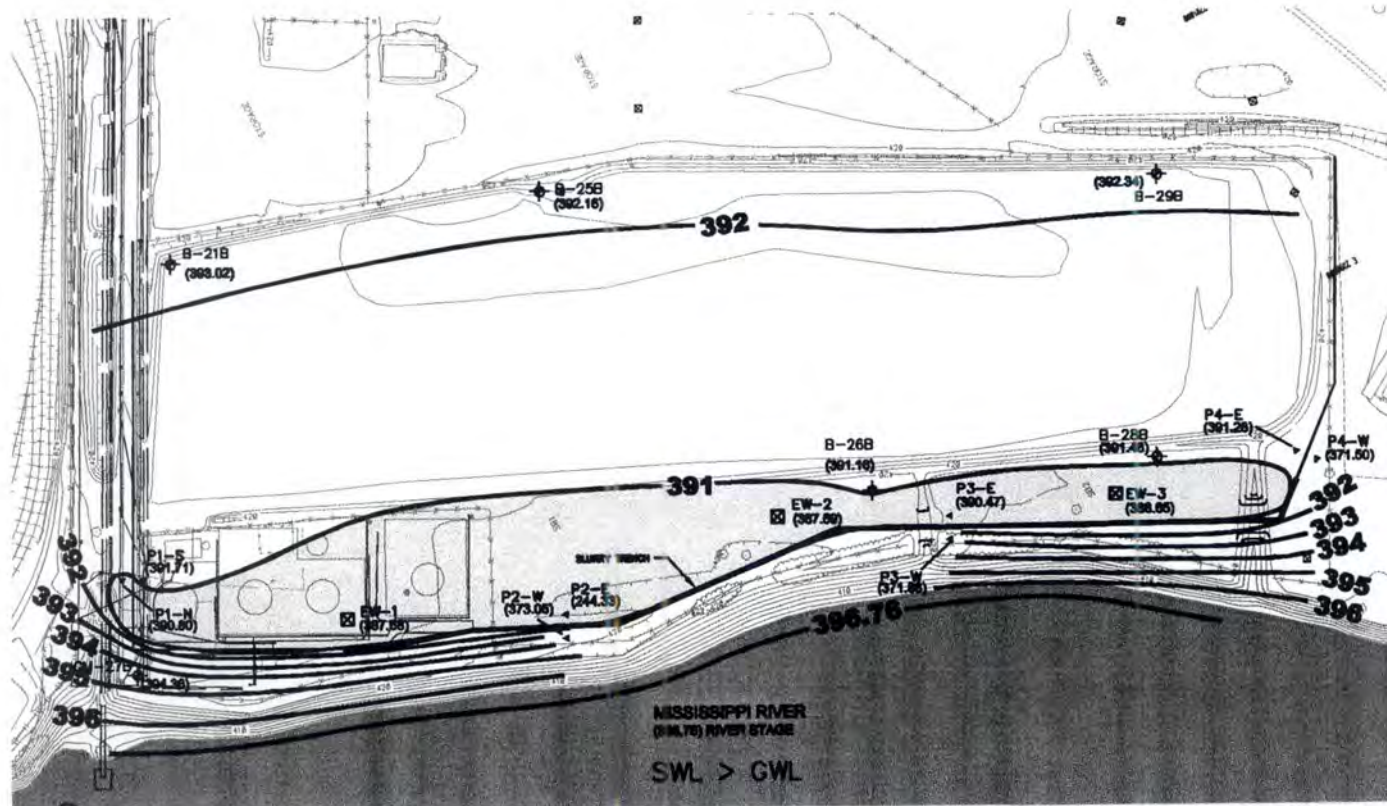
48



- LEGEND**
- 379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 - (379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL
- GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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	SITE-R SAUGET, ILLINOIS		FIG. NO.
	Groundwater Elevation April 08, 2004		49



LEGEND
 —379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION
 — COMPLETED SLURRY TRENCH
 — TRENCH WALL ALIGNMENT
 — HYDRAULIC TROUGH
 SWL > GWL
 GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
 SCALE FEET

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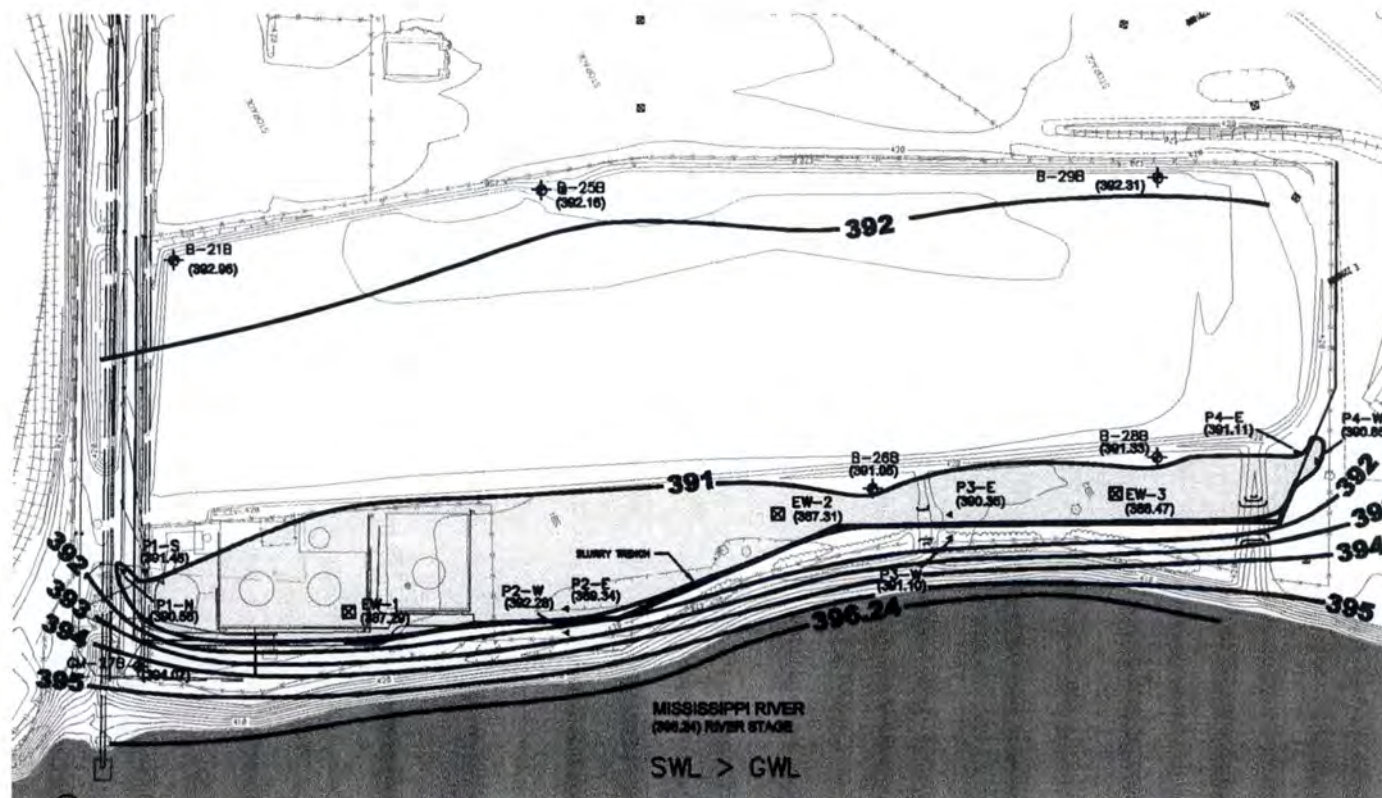
GROUNDWATER MIGRATION CONTROL SYSTEM
 SITE-R
 SAUGET, ILLINOIS

Groundwater Elevation
 April 09, 2004

PROJECT NO.

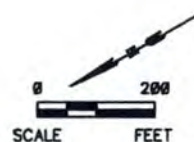
FIG. NO.

50



LEGEND

- 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
- (379) GROUNDWATER ELEVATION
- COMPLETED SLURRY TRENCH
- TRENCH WALL ALIGNMENT
- HYDRAULIC TROUGH
- SWL > GWL
- GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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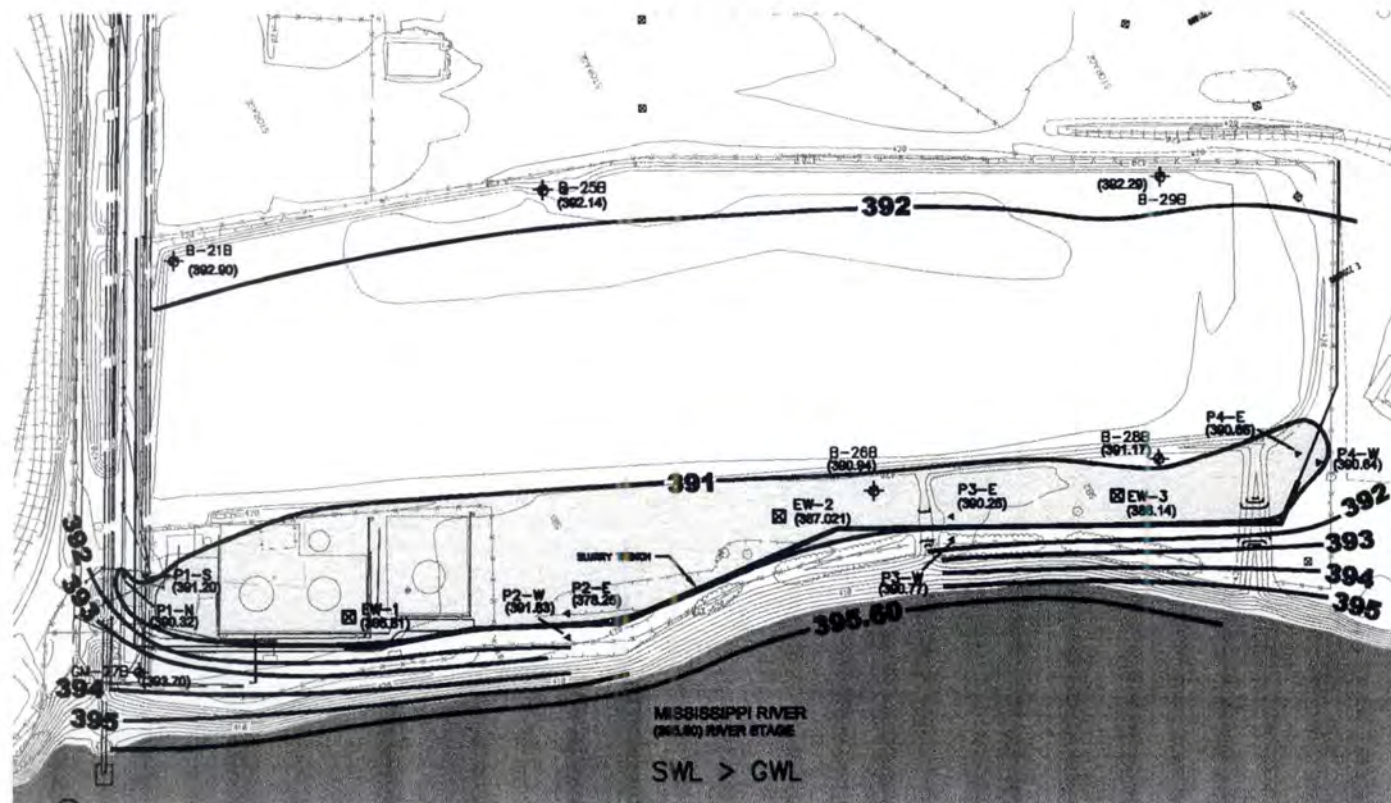
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 10, 2004

PROJECT NO.

FIG. NO.

51



- LEGEND**
- 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 - (379) GROUNDWATER ELEVATION
 - COMPLETED SLURRY TRENCH
 - TRENCH WALL ALIGNMENT
 - HYDRAULIC TROUGH
 - SWL > GWL
 - GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM
 SITE-R
 SAUGET, ILLINOIS

Groundwater Elevation
 April 11, 2004

PROJECT NO.
 FIG. NO.
 52

LINE OF EVIDENCE 5

GROUNDWATER LEVEL > PUMPING WATER LEVEL

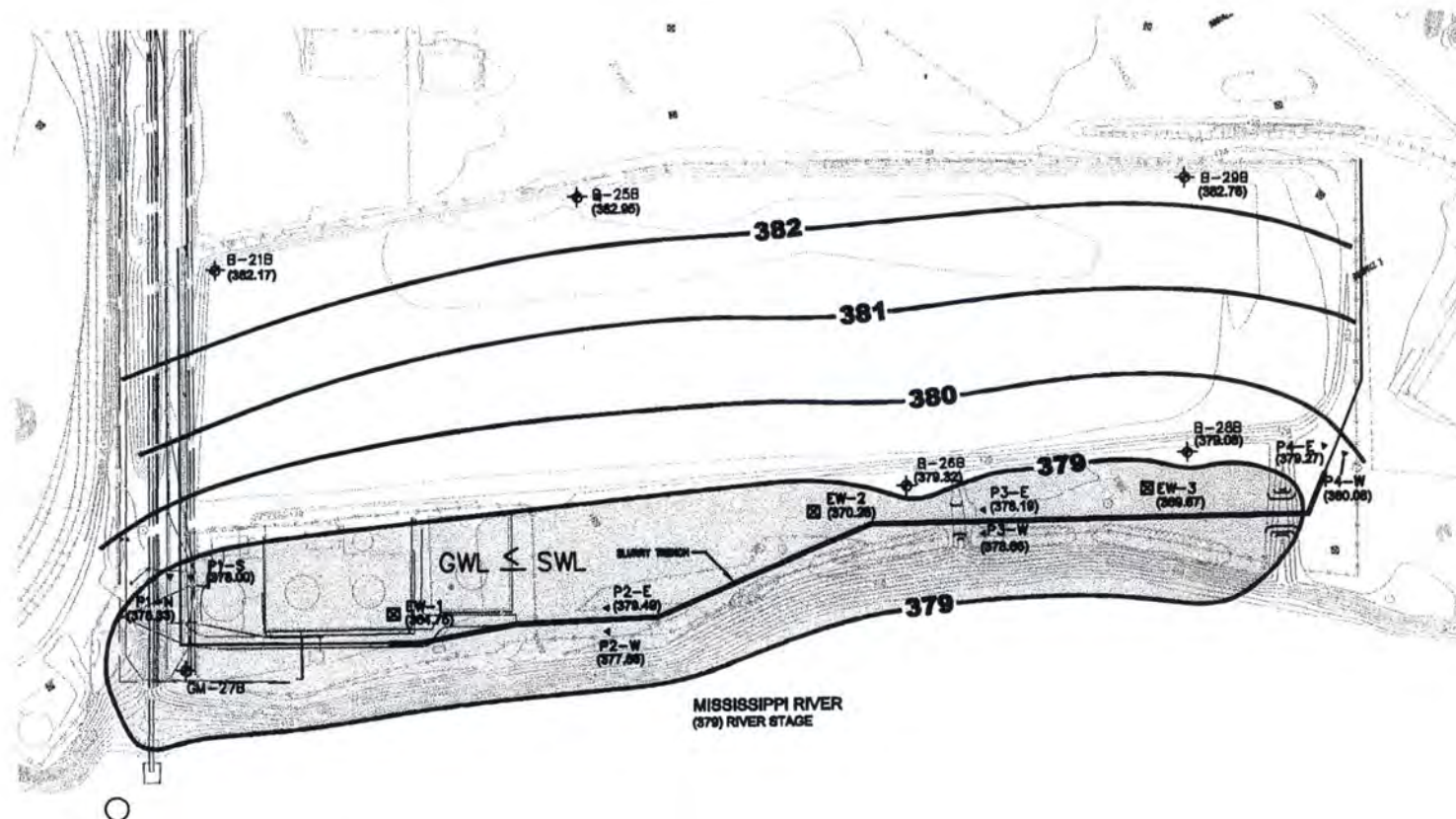
HYDRAULIC TROUGH ALONG RIVER

FEBRUARY to APRIL 2004

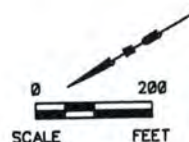
LINE OF EVIDENCE 5

Groundwater Levels Greater Than Pumping Water Levels
Hydraulic Trough along River
February 1, 2004 to April 11, 2004

Day	Days with Groundwater Control		
	<u>February 2004</u>	<u>March 2004</u>	<u>April 2004</u>
1	•	•	•
2	•	•	•
3	•	•	•
4	•	•	•
5	•	•	•
6	•	•	•
7	•	•	•
8	•	•	•
9	•	•	•
10	•	•	•
11	•	•	•
12	•	•	
13	•	•	
14	•	•	
15	•	•	
16	•	•	
17	•	•	
18	•	•	
19	•	•	
20	•	•	
21	•	•	
22	•	•	
23	•	•	
24	•	•	
25	•	•	
26	•	•	
27	•	•	
28	•	•	
29	•	•	
30	•	•	
31		•	

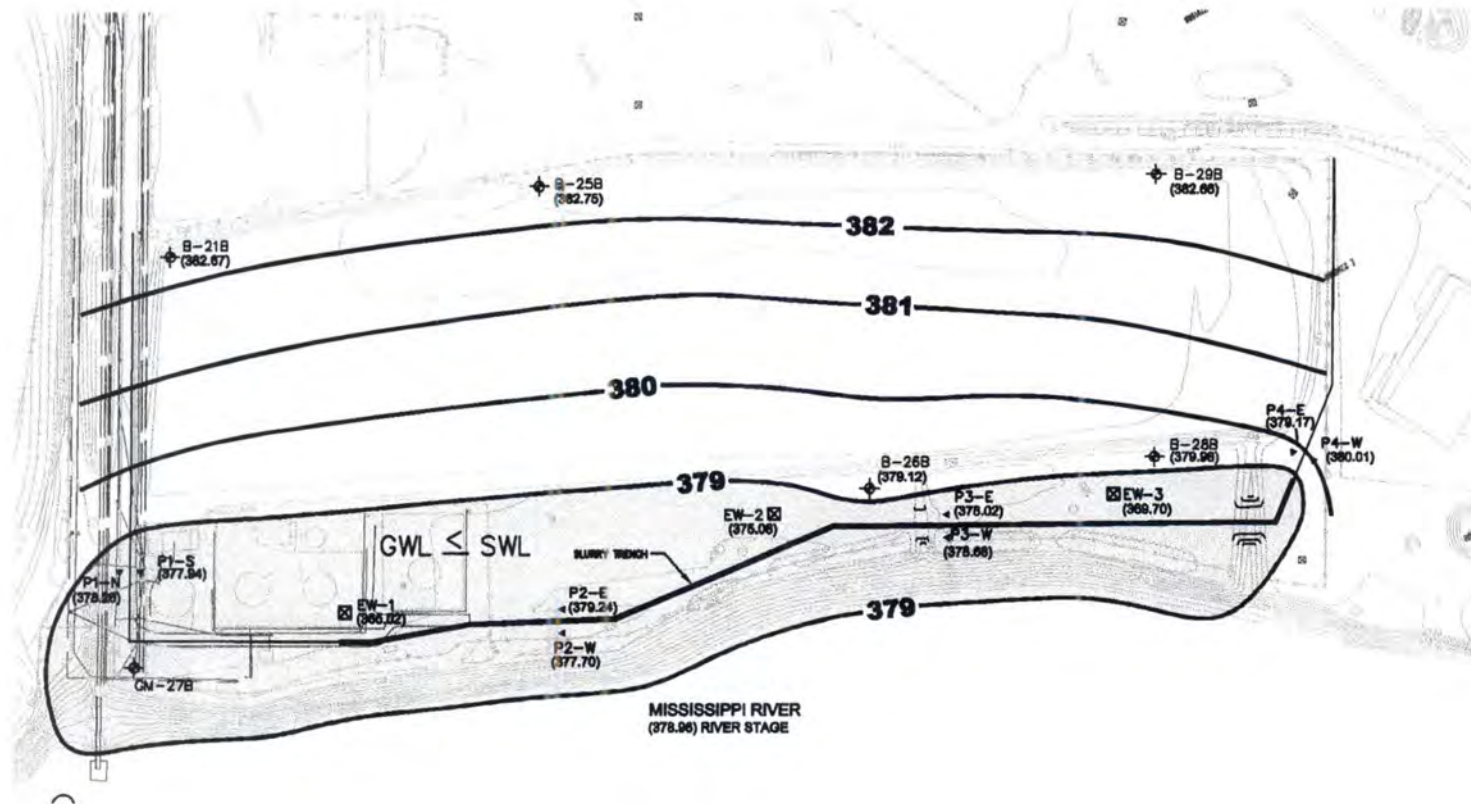


LEGEND
 -379- GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION
 — COMPLETED SLURRY TRENCH
 — TRENCH WALL ALIGNMENT
 — HYDRAULIC TROUGH
 GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation February 12, 2004	FIG. NO. 2

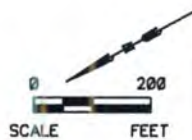


LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
(379) GROUNDWATER ELEVATION

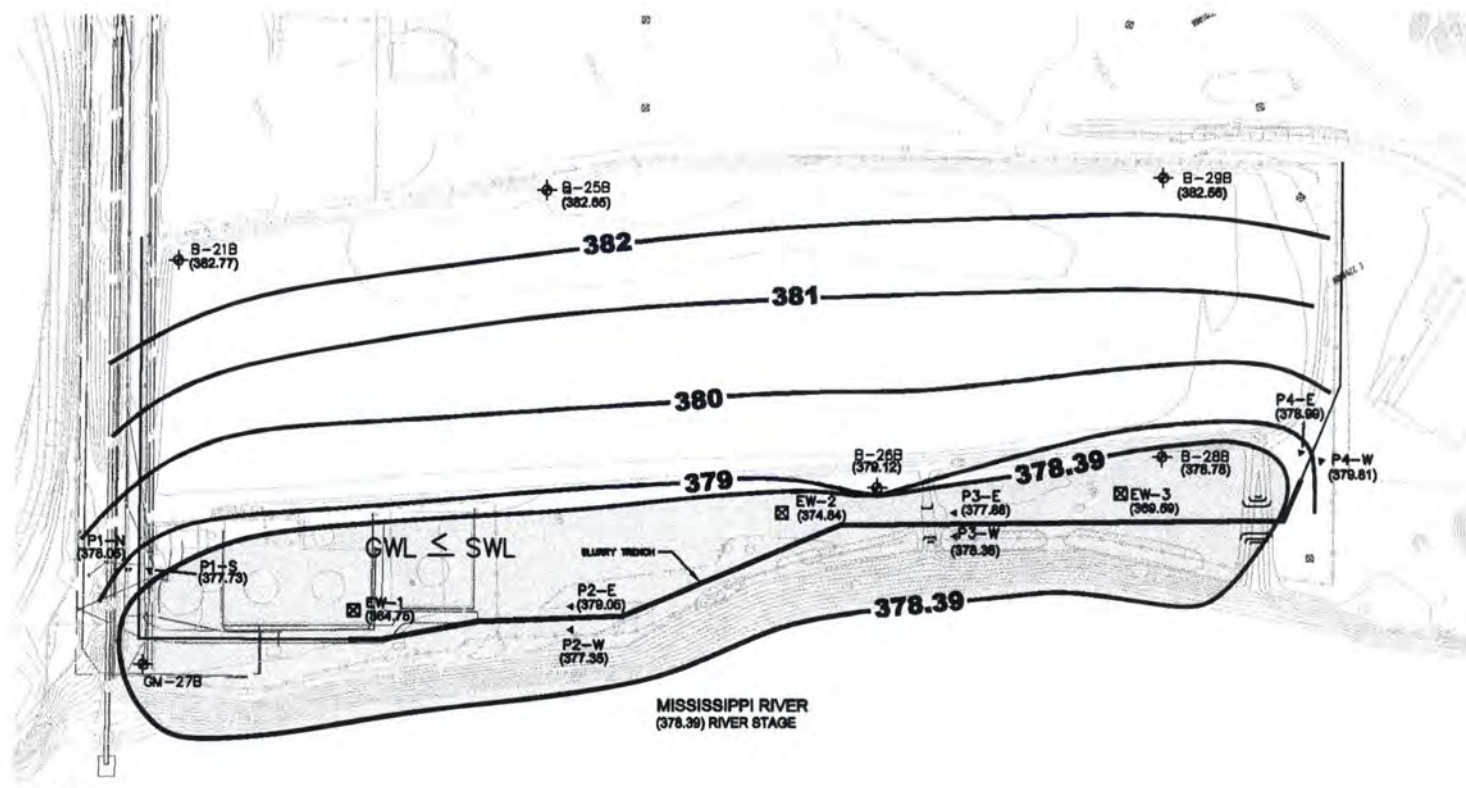
— COMPLETED SLURRY TRENCH
— TRENCH WALL ALIGNMENT
— HYDRAULIC TROUGH

GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

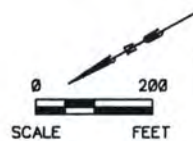


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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation February 16, 2004	FIG. NO. 3

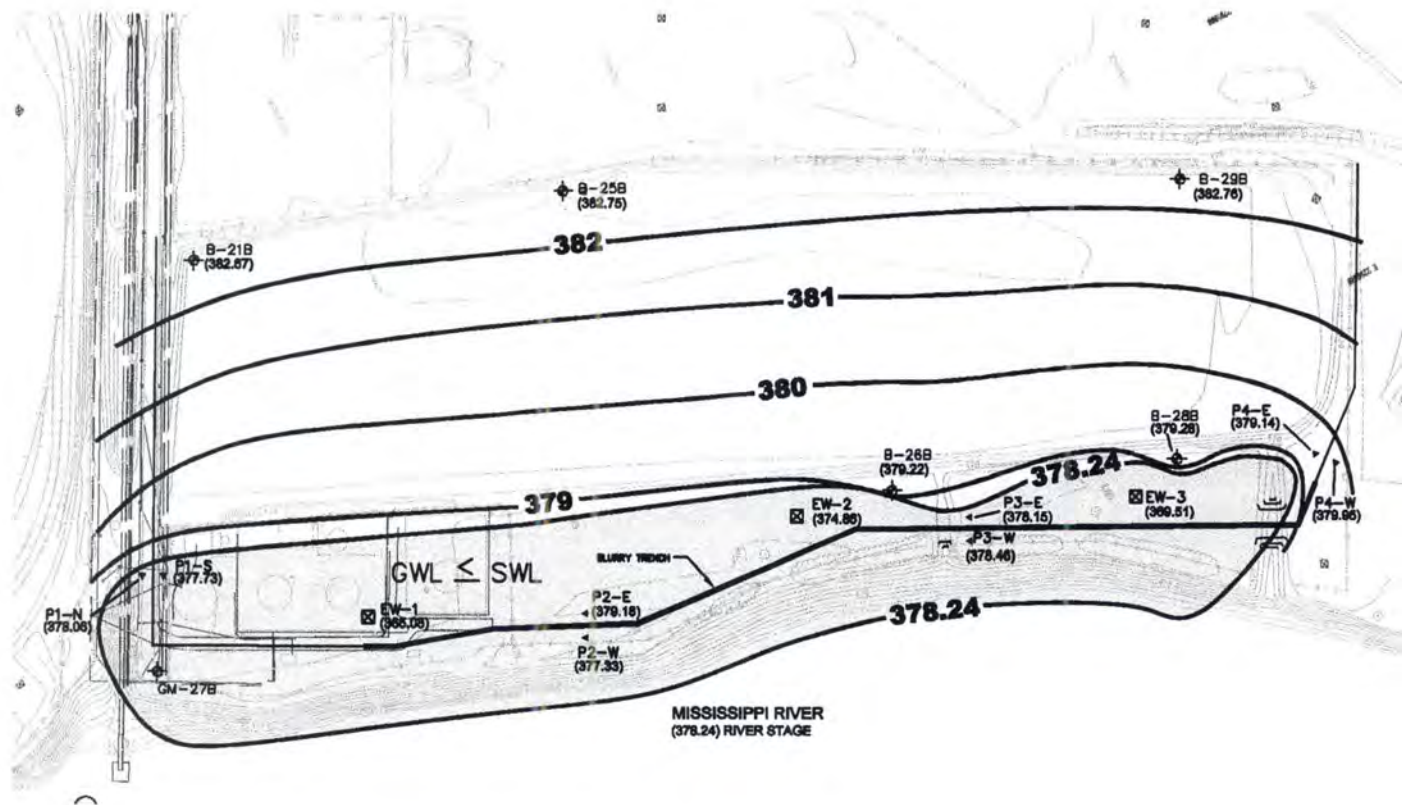


LEGEND
—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION
 — COMPLETED SLURRY TRENCH
 — TRENCH WALL ALIGNMENT
 — HYDRAULIC TROUGH
 GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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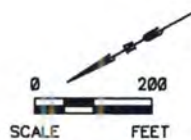
GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation February 17, 2004	FIG. NO. 4



LEGEND

- 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
- (379) GROUNDWATER ELEVATION
- COMPLETED SLURRY TRENCH
- TRENCH WALL ALIGNMENT
- HYDRAULIC TROUGH

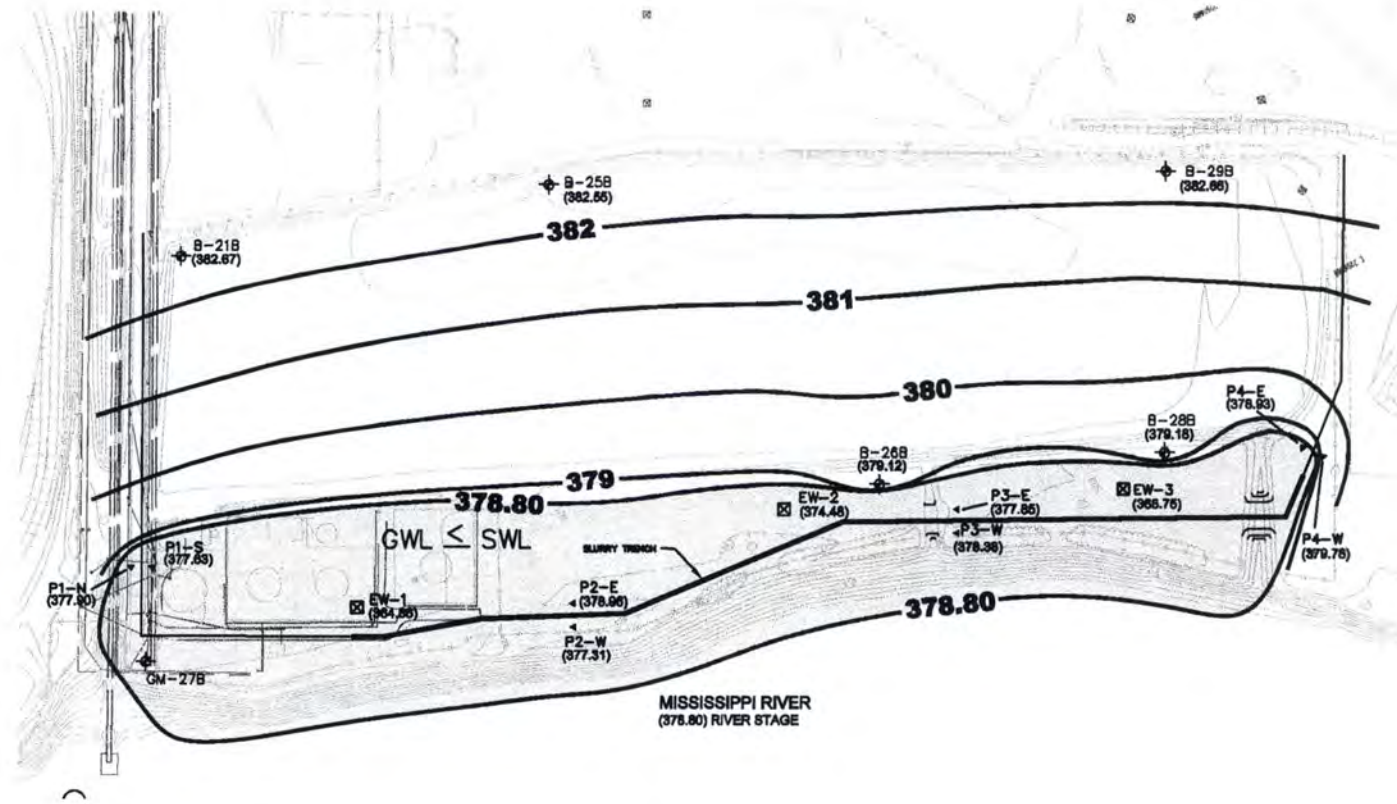
GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



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GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
Groundwater Elevation February 19, 2004	FIG. NO. 5



LEGEND

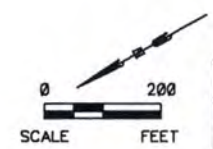
— 379 — GROUNDWATER CONTOUR LINE (1FT INTERVAL)
 (379) GROUNDWATER ELEVATION

— COMPLETED SLURRY TRENCH

— TRENCH WALL ALIGNMENT

— HYDRAULIC TROUGH

GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL



<p>SOLUTIATM Applied Chemistry, Creative Solutions</p>	<p>SOLUTIA INC. 575 MARYVILLE CENTRE DRIVE ST. LOUIS, MO. 63141</p>	GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
		Groundwater Elevation February 20, 2004	FIG. NO. 6

Notes

LINE OF EVIDENCE 6

SWL > OUTSIDE GWL > INSIDE GWL > PWL

(SWL > PZ-2W > PZ-2E > EW-1)

GRADIENT FROM RIVER TO PUMPING WELLS

FEBRUARY to APRIL 2004

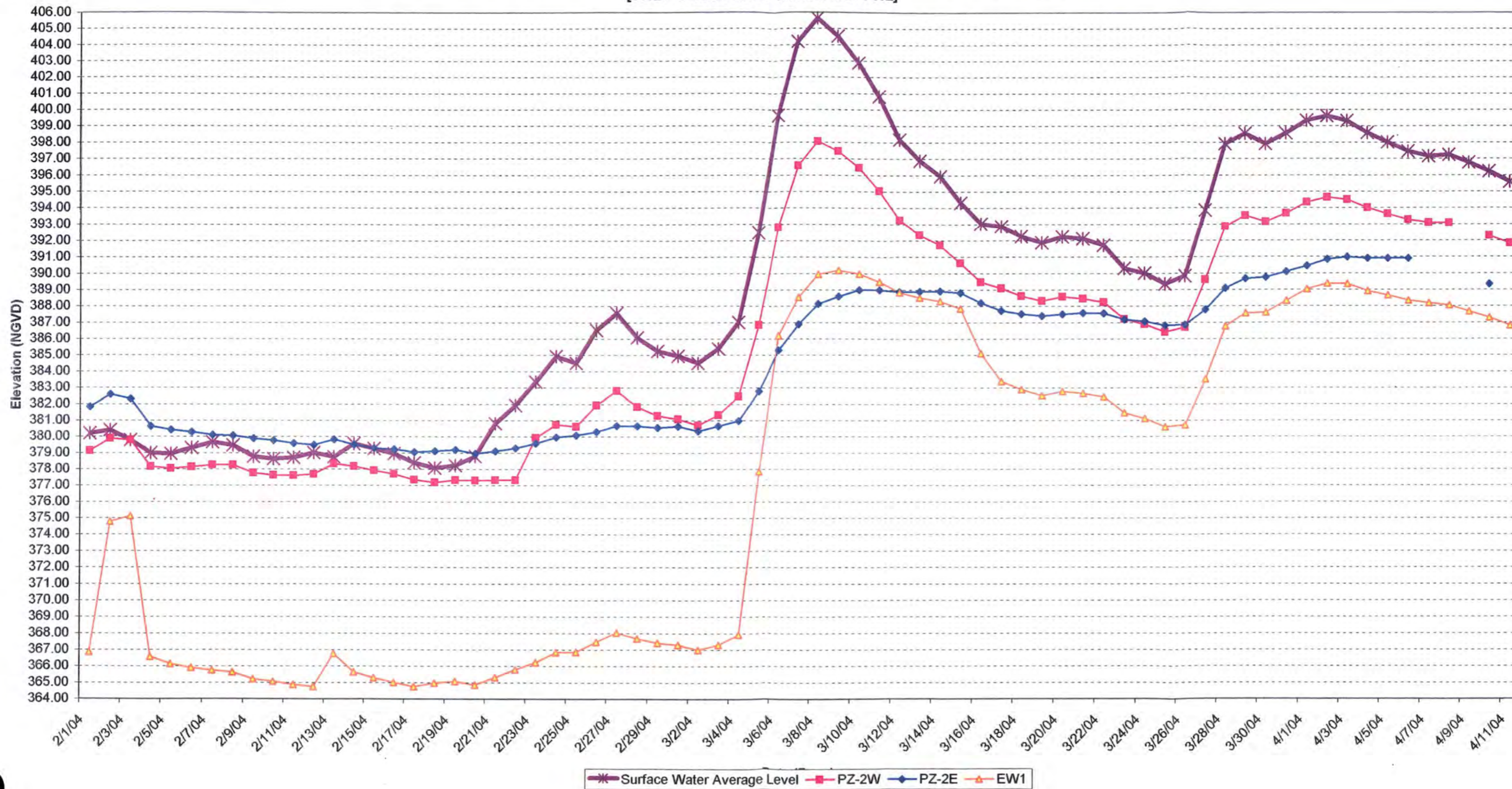
SECTION 3 - PHYSICAL CONTROL OF GROUNDWATER MIGRATION

LINE OF EVIDENCE 6

Surface Water Levels > Outside Groundwater Levels (PZ-2W) >
Inside Groundwater Levels (PZ-2E) > Pumping Water Levels (EW-1)
Gradient from River to Pumping Wells February 1 to April 11, 2004

Day	Days with Groundwater Control		
	<u>February 2004</u>	<u>March 2004</u>	<u>April 2004004</u>
1		•	•
2		•	•
3		•	•
4		•	•
5		•	•
6			•
7			•
8			•
9			•
10			•
11			•
12			
13		•	
14		•	
15		•	
16		•	
17		•	
18		•	
19		•	
20		•	
21		•	
22		•	
23	•	•	
24	•		
25	•		
26	•		
27	•	•	
28	•	•	
29	•	•	
30		•	
31		•	

Physical Control
 Sauget Area 2 Groundwater Migration Control System
 Line of Evidence 6
 Surface Water Level > Outside (West) Ground Water Level > Inside (East) Ground Water Level > Pumping Water Level
 [SWL > Outside GWL > Inside GWL > PWL]



LINE OF EVIDENCE 7

OUTSIDE GROUNDWATER LEVEL > INSIDE GROUNDWATER LEVEL

(PZ-2W > PZ-2E)

GRADIENT ACROSS SLURRY TRENCH/BARRIER WALL

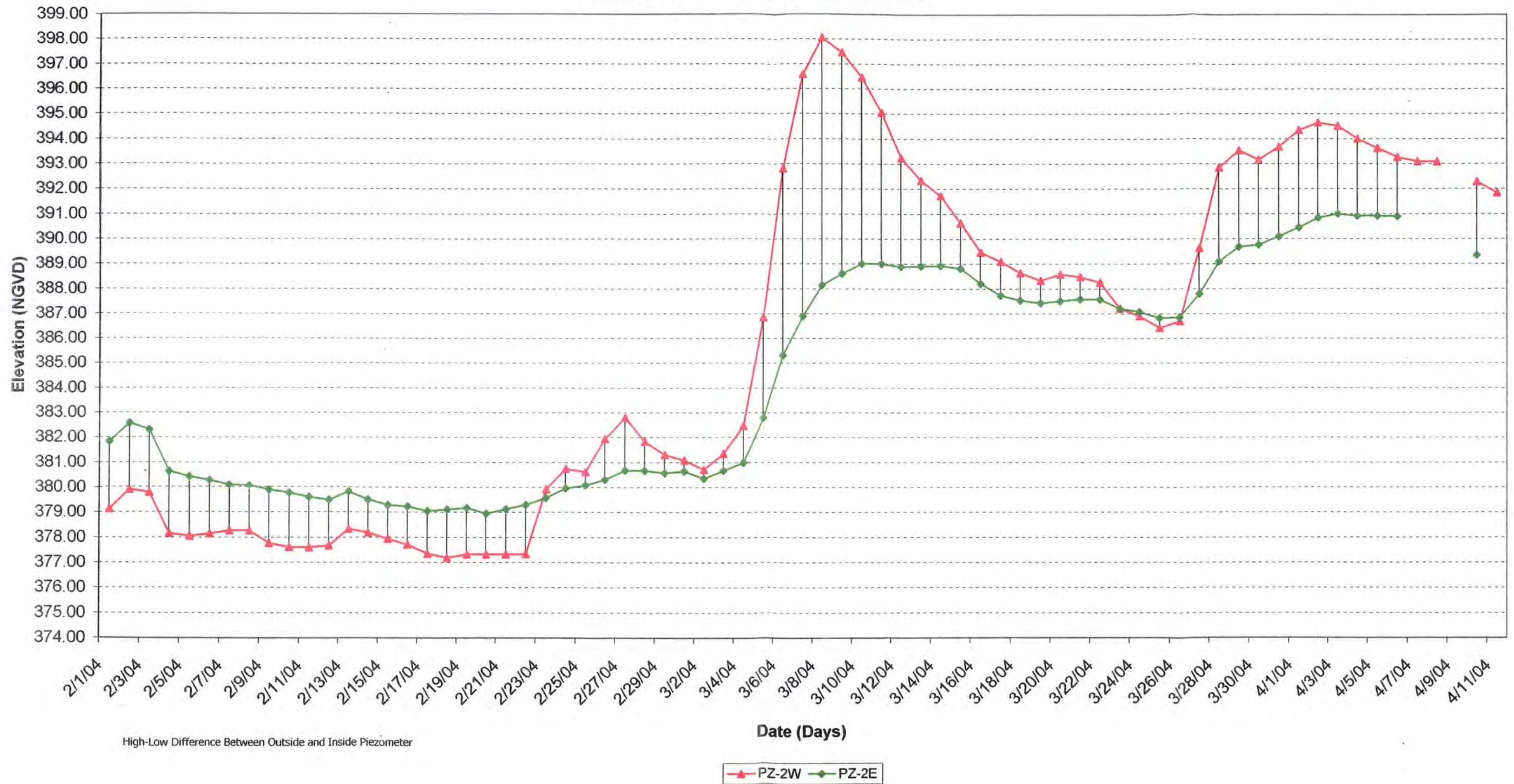
FEBRUARY to APRIL 2004

LINE OF EVIDENCE 7

Outside Groundwater Levels > Inside Groundwater Levels
Gradient across Slurry Trench/Barrier Wall (PZ-2W to PZ-2E)
February 1, 2004 to April 11, 2004

Day	Days with Groundwater Control		
	<u>February 2004</u>	<u>March 2004</u>	<u>April 2004</u>
1		•	•
2		•	•
3		•	•
4		•	•
5		•	•
6		•	•
7		•	•
8		•	•
9		•	•
10		•	•
11		•	•
12		•	
13		•	
14		•	
15		•	
16		•	
17		•	
18		•	
19		•	
20		•	
21		•	
22		•	
23	•	•	
24	•		
25	•		
26	•		
27	•	•	
28	•	•	
29	•	•	
30	•	•	
31		•	

**Physical Control
Sauget Area 2 Groundwater Migration Control System
Line of Evidence 7
Outside GWL versus Inside GWL**



LINE OF EVIDENCE 8

SWL > OUTSIDE GWL > INSIDE GWL > PWL

(SWL > PZ-3W > PZ-3E > EW-3)

GRADIENT FROM RIVER TO PUMPING WELLS

FEBRUARY to APRIL 2004

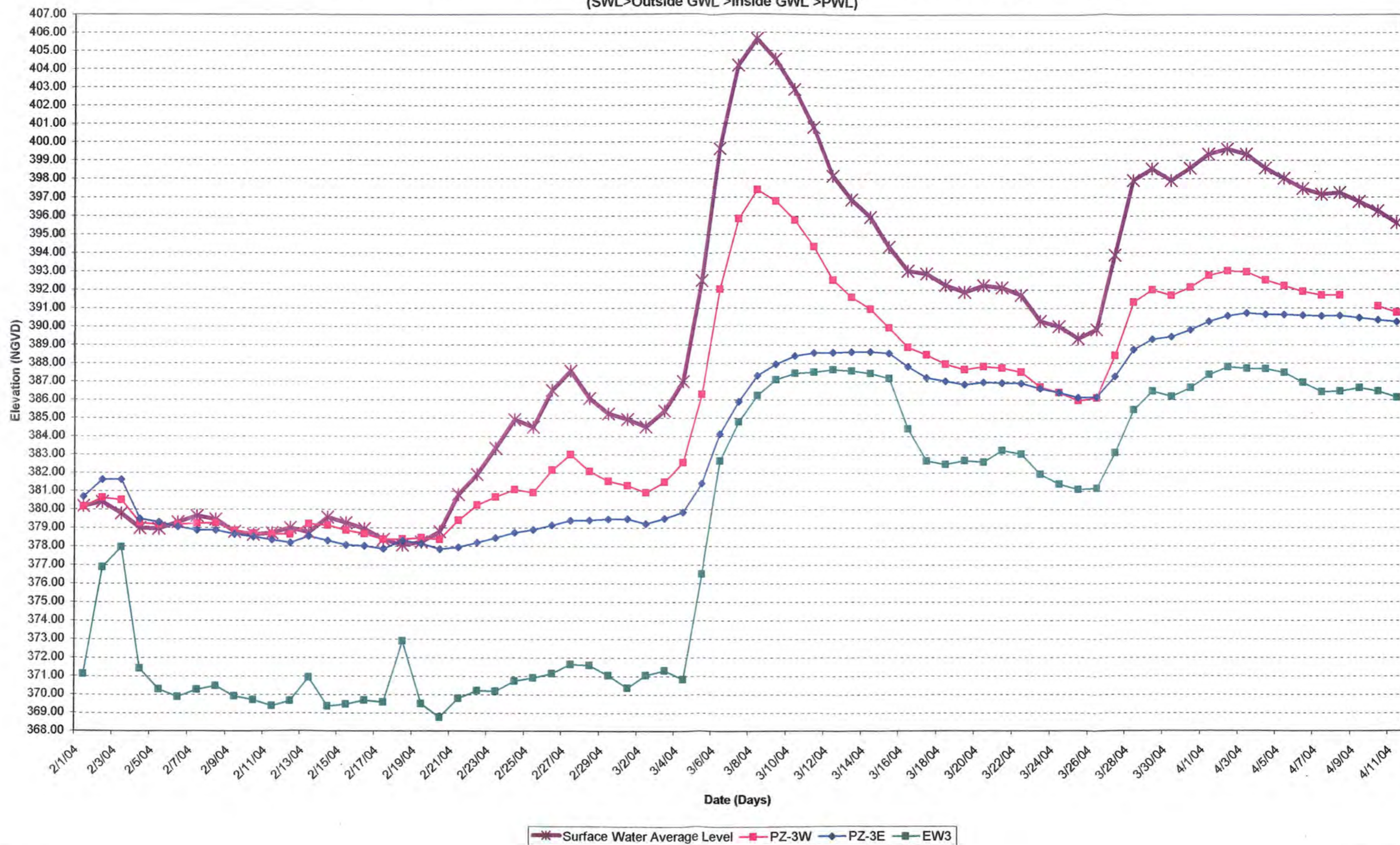
SECTION 3 - PHYSICAL CONTROL OF GROUNDWATER MIGRATION

LINE OF EVIDENCE 8

Surface Water Levels > Outside Groundwater Levels (PZ-3W) >
Inside Groundwater Levels (PZ-3E) > Pumping Water Levels (EW-3)
Gradient from River to Pumping Wells February 1 to April 11, 2004

Day	Days with Groundwater Control		
	<u>February 2004</u>	<u>March 2004</u>	<u>April 2004</u>
1		•	•
2		•	•
3		•	•
4		•	•
5		•	•
6		•	•
7	•	•	•
8	•	•	•
9	•	•	•
10	•	•	•
11	•	•	•
12	•	•	
13	•	•	
14	•	•	
15	•	•	
16	•	•	
17	•	•	
18	•	•	
19	•	•	
20	•	•	
21	•	•	
22	•	•	
23	•	•	
24	•		
25	•		
26	•		
27	•	•	
28	•	•	
29	•	•	
30		•	
31		•	

Physical Control
 Sauget Area 2 Groundwater Migration Control System
 Line of Evidence 8
 Surface Water Level > Outside (West) Ground Water Level > Inside (East) Ground Water Level > Pumping Water Level)
 (SWL>Outside GWL >Inside GWL >PWL)



LINE OF EVIDENCE 9

OUTSIDE GROUNDWATER LEVEL > INSIDE GROUNDWATER LEVEL

(PZ-3W > PZ-3E)

GRADIENT ACROSS SLURRY TRENCH/BARRIER WALL

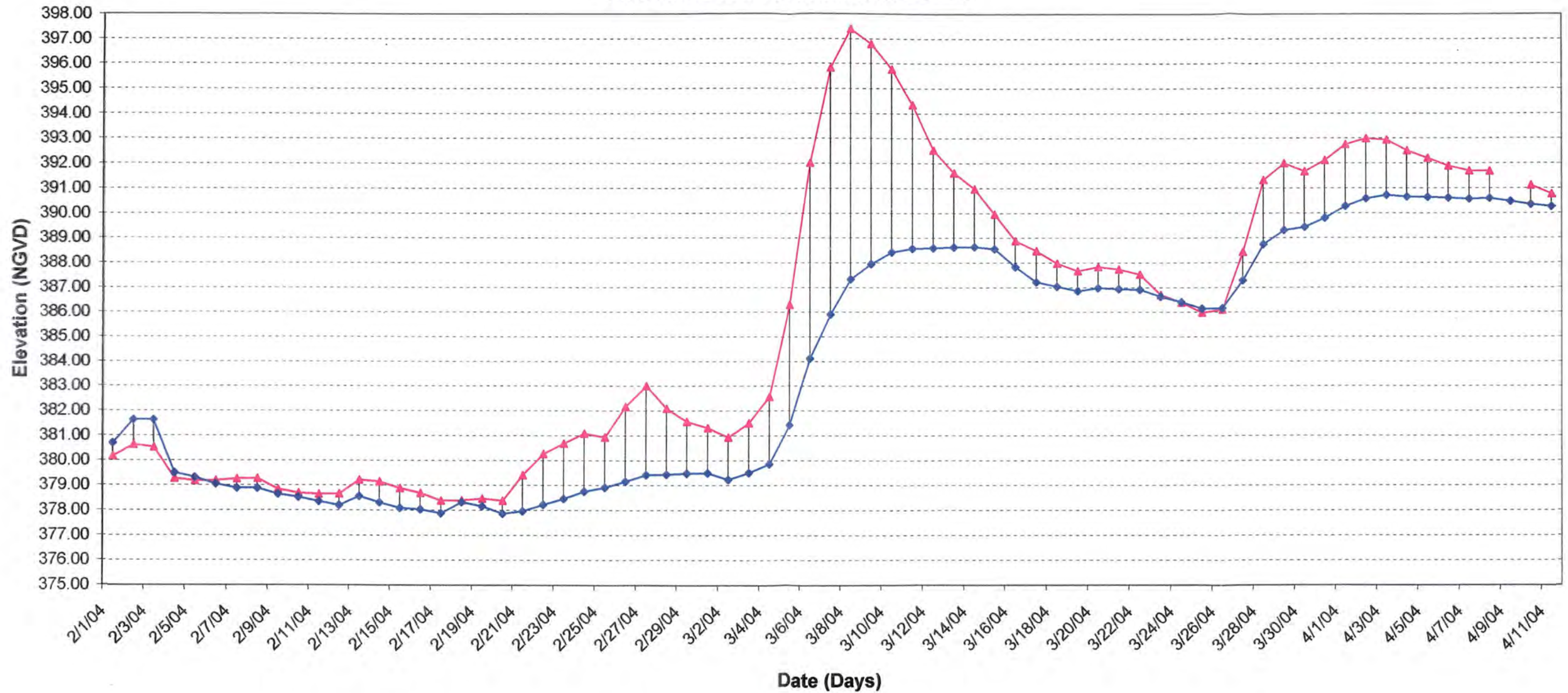
FEBRUARY to APRIL 2004

LINE OF EVIDENCE 9

Outside Groundwater Levels > Inside Groundwater Levels
Gradient across Slurry Trench/Barrier Wall (PZ-3W to PZ-3E)
February 1, 2004 to April 11, 2004

Day	Days with Groundwater Control		
	<u>February 2004</u>	<u>March 2004</u>	<u>April 2004</u>
1		•	•
2		•	•
3		•	•
4		•	•
5		•	•
6		•	•
7	•	•	•
8	•	•	•
9	•	•	•
10	•	•	•
11	•	•	•
12	•	•	
13	•	•	
14	•	•	
15	•	•	
16	•	•	
17	•	•	
18	•	•	
19	•	•	
20	•	•	
21	•	•	
22	•	•	
23	•	•	
24	•		
25	•		
26	•		
27	•	•	
28	•	•	
29	•	•	
30		•	
31		•	

Physical Control
Sauget Area 2 Groundwater Migration Control System
Line of Evidence 9
Outside GWL versus Inside GWL



High-Low Difference Between Outside and Inside Piezometer

—▲— PZ-3W —◆— PZ-3E

Notes

GROUNDWATER CONTROL

DATA GAP ANALYSIS

OCTOBER 22, 2003 TO APRIL 11, 2004

OCTOBER 2003 Groundwater Control Data Gap Analysis

			Line of Evidence								
Date	Hydraulic Control		1	2	3	4	5	6	7	8	9
			Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11, 2004					
10/22/2003	Yes			•	•						
10/23/2003	Yes			•	•						
10/24/2003	Yes			•	•						
10/25/2003	Yes			•	•						
10/26/2003	Yes			•	•						
10/27/2003	Yes			•	•						
10/28/2003	Yes			•	•						
10/29/2003	Yes			•	•						
10/30/2003	Yes			•	•						
10/31/2003	Yes			•	•						

NOVEMBER 2003 Groundwater Control Data Gap Analysis

		Line of Evidence								
Date	Hydraulic Control	1	2	3	4	5	6	7	8	9
		Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11, 2004					
11/1/2003	Yes		•	•						
11/2/2003	Yes		•	•						
11/3/2003	Yes		•	•						
11/4/2003	Yes		•	•						
11/5/2003	Yes	•	•	•						
11/6/2003	Yes	•	•	•						
11/7/2003	Yes	•	•	•						
11/8/2003	Yes	•	•	•						
11/9/2003	Yes	•	•	•						
11/10/2003	Yes	•	•	•						
11/11/2003	Yes		•	•						
11/12/2003	Yes	•	•	•						
11/13/2003	Yes	•	•	•						
11/14/2003	Yes		•	•						
11/15/2003	Yes		•	•						
11/16/2003	Yes		•	•						
11/17/2003	Yes		•	•						
11/18/2003	Yes	•	•	•						
11/19/2003	Yes	•	•	•						
11/20/2003	Yes	•	•	•						
11/21/2003	Yes	•	•	•						
11/22/2003	Yes	•	•	•						
11/23/2003	Yes	•	•	•						
11/24/2003	Yes	•	•	•						
11/25/2003	Yes	•	•	•						
11/26/2003	Yes	•	•	•						
11/27/2003	Yes	•	•	•						
11/28/2003	Yes	•	•	•						
11/29/2003	Yes	•	•	•						
11/30/2003	Yes		•	•						

DECEMBER 2003 Groundwater Control Data Gap Analysis

		Line of Evidence								
Date	Hydraulic Control	1	2	3	4	5	6	7	8	9
		Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11, 2004					
12/1/2003	Yes	•	•	•						
12/2/2003	Yes		•	•						
12/3/2003	Yes		•	•						
12/4/2003	Yes		•	•						
12/5/2003	Yes		•	•						
12/6/2003	Yes		•	•						
12/7/2003	Yes		•	•						
12/8/2003	Yes		•	•						
12/9/2003	Yes		•	•						
12/10/2003	Yes	•	•	•						
12/11/2003	Yes	•	•	•						
12/12/2003	Yes	•	•	•						
12/13/2003	Yes	•	•	•						
12/14/2003	Yes	•	•	•						
12/15/2003	Yes	•	•	•						
12/16/2003	Yes	•	•	•						
12/17/2003	Yes	•	•	•						
12/18/2003	Yes	•	•	•						
12/19/2003	Yes	•	•	•						
12/20/2003	Yes	•	•	•						
12/21/2003	Yes		•	•						
12/22/2003	Yes		•	•						
12/23/2003	Yes		•	•						
12/24/2003	Yes	•	•	•						
12/25/2003	Yes	•	•	•						
12/26/2003	Yes	•	•	•						
12/27/2003	Yes		•	•						
12/28/2003	Yes		•	•						
12/29/2003	Yes		•	•						
12/30/2003	Yes		•	•						
12/31/2003	Yes		•	•						

JANUARY 2004

Groundwater Control Data Gap Analysis

		Line of Evidence								
Date	Hydraulic Control	1	2	3	4	5	6	7	8	9
		Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11, 2004					
1/1/2004	Yes		•	•						
1/2/2004	Yes	•	•	•						
1/3/2004	Yes		•	•						
1/4/2004	Yes	•	•	•						
1/5/2004	Yes	•	•	•						
1/6/2004	Yes	•	•	•						
1/7/2004	Yes		•	•						
1/8/2004	Yes		•	•						
1/9/2004	Yes		•	•						
1/10/2004	Yes		•	•						
1/11/2004	Yes		•	•						
1/12/2004	Yes		•	•						
1/13/2004	Yes		•	•						
1/14/2004	Yes		•	•						
1/15/2004	Yes		•	•						
1/16/2004	Yes		•	•						
1/17/2004	Yes		•	•						
1/18/2004	Yes		•	•						
1/19/2004	Yes	•	•	•						
1/20/2004	Yes		•	•						
1/21/2004	Yes		•	•						
1/22/2004	Yes	•	•	•						
1/23/2004	Yes		•	•						
1/24/2004	Yes		•	•						
1/25/2004	Yes	•	•	•						
1/26/2004	Yes	•	•	•						
1/27/2004	Yes		•	•						
1/28/2004	Yes		•	•						
1/29/2004	Yes		•	•						
1/30/2004	Yes		•	•						
1/31/2004	Yes		•	•						

FEBRUARY 2003 Groundwater Control Data Gap Analysis

		Line of Evidence								
Date	Hydraulic Control	1	2	3	4	5	6	7	8	9
		Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11, 2004					
2/1/2004	Yes					•				
2/2/2004	Yes					•				
2/3/2004	Yes					•				
2/4/2004	Yes					•				
2/5/2004	Yes					•				
2/6/2004	Yes					•				
2/7/2004	Yes					•			•	•
2/8/2004	Yes					•			•	•
2/9/2004	Yes					•			•	•
2/10/2004	Yes					•			•	•
2/11/2004	Yes					•			•	•
2/12/2004	Yes					•			•	•
2/13/2004	Yes					•			•	•
2/14/2004	Yes					•			•	•
2/15/2004	Yes					•			•	•
2/16/2004	Yes					•			•	•
2/17/2004	Yes					•			•	•
2/18/2004	Yes					•			•	•
2/19/2004	Yes					•			•	•
2/20/2004	Yes					•			•	•
2/21/2004	Yes				•	•			•	•
2/22/2004	Yes				•	•			•	•
2/23/2004	Yes				•	•	•	•	•	•
2/24/2004	Yes				•	•	•	•	•	•
2/25/2004	Yes				•	•	•	•	•	•
2/26/2004	Yes				•	•	•	•	•	•
2/27/2004	Yes				•	•	•	•	•	•
2/28/2004	Yes				•	•	•	•	•	•
2/29/2004	Yes				•	•	•	•	•	•

MARCH 2004

Groundwater Control Data Gap Analysis

		Line of Evidence								
Date	Hydraulic Control	1	2	3	4	5	6	7	8	9
		Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11, 2004					
3/1/2004	Yes				•	•	•	•	•	•
3/2/2004	Yes				•	•	•	•	•	•
3/3/2004	Yes				•	•	•	•	•	•
3/4/2004	Yes				•	•	•	•	•	•
3/5/2004	Yes				•	•	•	•	•	•
3/6/2004	Yes				•	•	•	•	•	•
3/7/2004	Yes				•	•	•	•	•	•
3/8/2004	Yes				•	•	•	•	•	•
3/9/2004	Yes				•	•	•	•	•	•
3/10/2004	Yes				•	•	•	•	•	•
3/11/2004	Yes				•	•	•	•	•	•
3/12/2004	Yes				•	•	•	•	•	•
3/13/2004	Yes				•	•	•	•	•	•
3/14/2004	Yes				•	•	•	•	•	•
3/15/2004	Yes				•	•	•	•	•	•
3/16/2004	Yes				•	•	•	•	•	•
3/17/2004	Yes				•	•	•	•	•	•
3/18/2004	Yes				•	•	•	•	•	•
3/19/2004	Yes				•	•	•	•	•	•
3/20/2004	Yes				•	•	•	•	•	•
3/21/2004	Yes				•	•	•	•	•	•
3/22/2004	Yes				•	•	•	•	•	•
3/23/2004	Yes				•	•	•	•	•	•
3/24/2004	Yes				•	•	•	•	•	•
3/25/2004	Yes				•	•	•	•	•	•
3/26/2004	Yes				•	•	•	•	•	•
3/27/2004	Yes				•	•	•	•	•	•
3/28/2004	Yes				•	•	•	•	•	•
3/29/2004	Yes				•	•	•	•	•	•
3/30/2004	Yes				•	•	•	•	•	•
3/31/2004	Yes				•	•	•	•	•	•

APRIL 2004

Groundwater Control Data Gap Analysis

			Line of Evidence								
Date	Hydraulic Control		1	2	3	4	5	6	7	8	9
			Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11, 2004					
4/1/2004	Yes					•	•	•	•	•	•
4/2/2004	Yes					•	•	•	•	•	•
4/3/2004	Yes					•	•	•	•	•	•
4/4/2004	Yes					•	•	•	•	•	•
4/5/2004	Yes					•	•	•	•	•	•
4/6/2004	Yes					•	•	•	•	•	•
4/7/2004	Yes					•	•	•	•	•	•
4/8/2004	Yes					•	•	•	•	•	•
4/9/2004	Yes					•	•	•	•	•	•
4/10/2004	Yes					•	•	•	•	•	•
4/11/2004	Yes					•	•	•	•	•	•

<u>LINE OF EVIDENCE</u>	<u>SUMMARY</u>
Line of Evidence 1	Surface Water Level Greater than Groundwater Level Gradient Reversal - No Discharge to Surface Water October 2003 to January 2004
Line of Evidence 2	Surface Water Level Greater than Pumping Water Level Gradient from River to Pumping Wells October 2003 to January 2004
Line of Evidence 3	Groundwater Level Greater than Pumping Water Level Gradient from Piezometers to Pumping Wells October 2003 to January 2004
Line of Evidence 4	Surface Water Level Greater than Groundwater Level Gradient Reversal - No Discharge to Surface Water February to April 2004
Line of Evidence 5	Groundwater Level Greater than Pumping Water Level Gradient from Piezometers to Pumping Wells February to January 2004
Line of Evidence 6	Surface Water Level > Outside Groundwater Level (PZ-2W) > Inside Groundwater Level (PZ-2E) > Pumping Water Level Gradient from River to Pumping Wells February to April 2004
Line of Evidence 7	Outside Groundwater Level (PZ-2W) > Inside Groundwater Level (PZ-2E) Gradient across Slurry Trench/Barrier Wall February to April 2004
Line of Evidence 8	Surface Water Level > Outside Groundwater Level (PZ-3W) > Inside Groundwater Level (PZ-3E) > Pumping Water Level Gradient from River to Pumping Wells February to April 2004
Line of Evidence 9	Outside Groundwater Level (PZ-3W) > Inside Groundwater Level (PZ-3E) Gradient across Slurry Trench/Barrier Wall February to April 2004

Notes

PLUME STABILITY MONITORING PLAN

PLUME VOLUME MONITORING

- **Baseline Plume Volume Determination**

- Measure water levels in WGK piezometers quarterly for one year
- Input groundwater levels for each quarter into particle track model
- Determine plume area for each quarter
- Overlay boundaries of quarterly plume areas and determine maximum plume area by tracing the outside boundary of the overlapping plume areas
- Calculate baseline plume volume using 100 ft. aquifer saturated thickness

- **Plume Volume Monitoring**

- Measure water levels in WGK piezometers
- Input groundwater levels into particle track model
- Determine plume area
- Calculate plume volume using 100 ft. aquifer saturated thickness

GROUNDWATER QUALITY MONITORING

- **Upgradient Groundwater Quality Monitoring**

- One upgradient monitoring well cluster, MW-4 (SHU, MHU, DHU) at eastern tip of plant process area to define influent groundwater concentrations.

- **Downgradient Groundwater Quality Monitoring**

- Two downgradient monitoring well clusters, MW-2 (SHU, MHU, DHU) and MW-3 (SHU, MHU, DHU), located within the WGK Plume at the western boundary of Lot F
 - One cluster located north of the north boundary of the SA2/GMCS capture zone
 - One cluster located in the northwest corner of Lot F

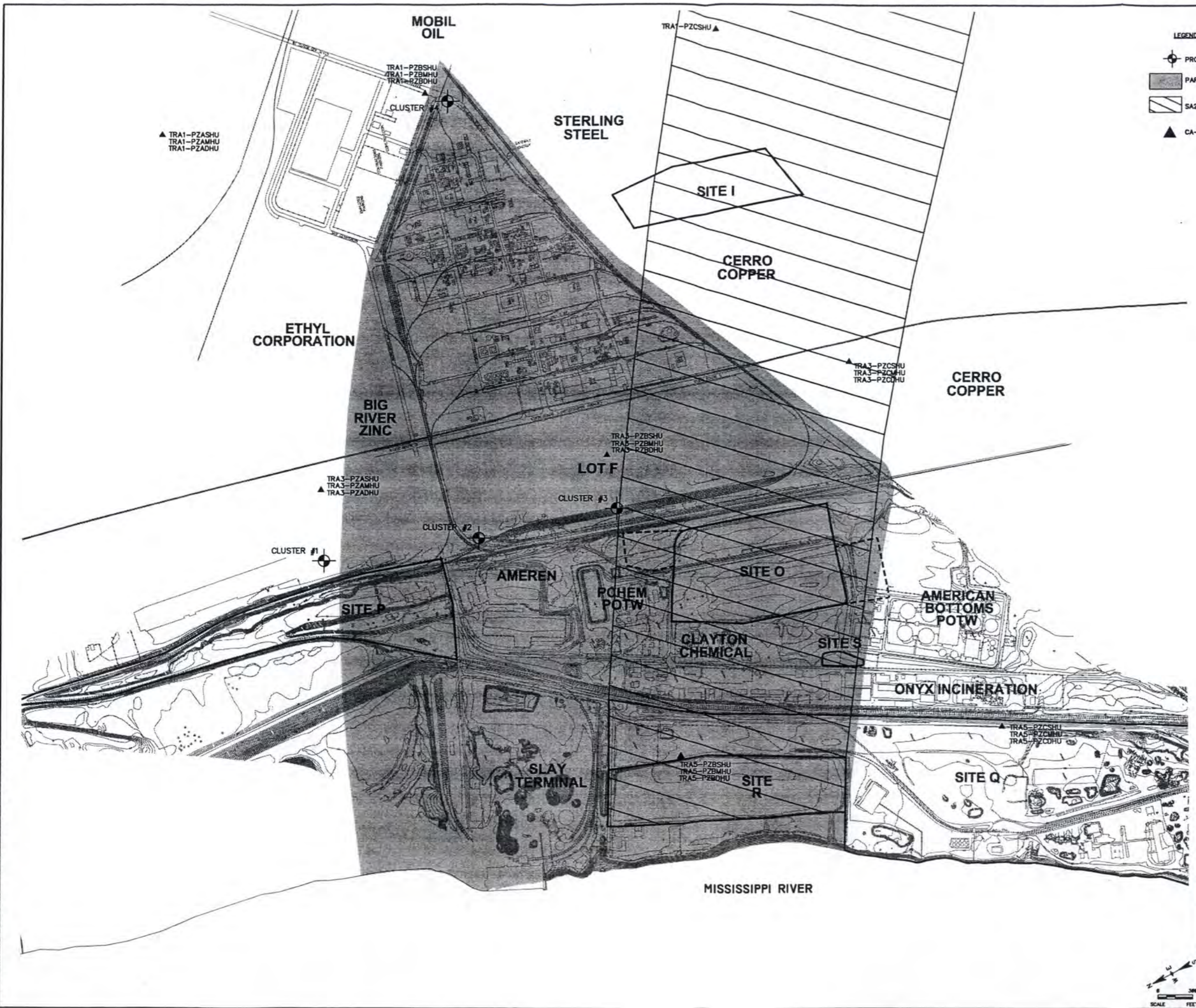
- **Northern Plume Boundary Groundwater Quality Monitoring**

- One monitoring well cluster located on a line parallel to the western boundary of Lot F and outside of the north boundary of the WGK Particle Track Plume
- One year baseline monitoring of VOCs and SVOCs to determine average and standard deviation

UNSTABLE PLUME CRITERIA

- Plume volume increases > 10 %; and
- Four consecutive sampling rounds in monitoring well clusters MW-2 and MW-3 at the downgradient edge of Lot F show a consistent upward trend using CUSUM Chart Statistical Method; and
- Four consecutive sampling rounds at the north boundary of the WGK Plume show consistent VOC and SVOC concentrations greater than three standard deviations in monitoring well cluster MW-1 using the Shewart Control Chart Statistical Method.

**PLUME STABILITY
MONITORING WELL LOCATION MAP**




LEGEND

- PROPOSED MONITORING WELL CLUSTER
- PARTICLE TRACKING PLUME (OSI SEPTEMBER 30, 2003)
- SA2/GMCS CAPTURE ZONE
- CA-750 PIEZOMETER CLUSTER

CA-750 MIGRATION OF CONTAMINATED GROUNDWATER UNDER CONTROL ADDENDUM SOUTHERN W.G. KUMMICH PLANT SAUGET, ILLINOIS		
Groundwater Monitoring Plan		
Date: 9/22/83	Project Number: 21561197.00002	Figure Number: 1
Drawn by: djd	Design by: tja	Checked by:
URS		

SOLUTIA - 159



SOLUTIA

Solutions for a better life.

April 19, 2004

Mr. Ken Bardo
U.S. EPA Region 5
Corrective Action Section
77 West Jackson Blvd
Chicago, IL 60604-3590

RE: Solutia W. G. Krummrich Plant

Dear Ken:

The following is being submitted in respond to questions raised during our March 17th and 18th meeting, and in further support our CA725 for the W. G. Krummrich Plant.

- **Recreational Fisher Exposure Scenario**

On May 6, 2003, USEPA Region 5 CERCLA approved the RI/FS Support Sampling Plan (SSP) for the Sauget Area 2 Sites (Attachment 1). In Section 8.0 (Surface Water, Sediment and Biota Sampling Plan) of this USEPA-approved work plan, specifically Pages 8-1 and 8-2 (Attachment 2), buffalo fish fillets were selected for sampling and subsequent input into the recreational fisher exposure scenario evaluated in the Sauget Area 2 Sites Human Health Risk Assessment. Channel catfish and shad were sampled for use in the Sauget Area 2 Sites Ecological Risk Assessment.

- **Trespassing Teenager Exposure Scenario**

Sauget Area 2 Site R is a closed industrial-waste disposal area located between the US Army Corps of Engineers flood control levee and the Mississippi River. It is surrounded by bulk storage and shipping operations (Slay Terminals and Eagle Marine Industries), waste treatment facilities (Onyx hazardous waste incinerators, the Village of Sauget P-Chem Plant and the American Bottoms Regional Treatment Facility), a disused electricity generation station and an active electric power distribution station. Access to Site R, and the Mississippi River downgradient of Site R, are restricted by fencing and locked gates. Riverview Road is the only road that leads to Site R and a locked gate prevents access to the site and river. In 1985, a 2,250 ft. long rock revetment was installed along the east bank of the Mississippi River adjacent to Site R. The purpose of the stabilization was to prevent further erosion of the riverbank and thereby minimize potential for release of waste material from the landfill. This rip rap revetment restricts access to the river bank down gradient of Site R and, combined with a steep slope, makes walking on the river bank very difficult. High river velocity limits access to the water immediately adjacent to Site

R and the presence of a barge fleeting facility in this area further restricts access. Large barge strings are assembled and moored in this area, making it difficult to trespass in this area.

All of these factors, which restrict access to the site and adjacent river, make trespassing an incomplete exposure pathway. Therefore, there is no current human exposure to sediments and surface water down gradient of Sauget Area 2 Site R.

- **Groundwater Exposure**

As demonstrated in the April 19, 2004 CA750 Groundwater Migration Under Control Addendum, groundwater discharging to the Mississippi River down gradient of Sauget Area 2 Site R is hydraulically controlled by the Sauget Area 2 Groundwater Migration Control System. Therefore, there is no current human exposure to groundwater.

Please advise if further information is required.

Sincerely,



Steven D. Smith

cc:	Nabil Fayoumi	EPA
	Sandra Bron	Illinois EPA
	Jim Moore	Illinois EPA
	Gina Search	Illinois EPA
	Bruce Yare	Solutia
	Richard Williams	Williams & Associates
	Bob Hiller	Solutia



Kelbardsky / Smith 05/2/02
MAY 8 2002

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

ATTACHMENT 1

May 6, 2002

REPLY TO THE ATTENTION OF:

(SR-6J)

Mr. Steven D. Smith
Solutia, Inc.
P.O. Box 66760
St. Louis, Missouri 63166-6760

RE: Conditional Approval - RI/FS Support Sampling Plan
Sauget Area 2 Site - St. Clair County, Illinois

Dear Mr. Smith:

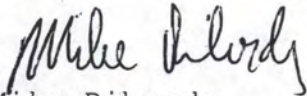
The United States Environmental Protection Agency (U.S. EPA) has completed the review of the April 15, 2002, Revised RI/FS Support Sampling Plan (SSP) for the Sauget Area 2 Site. Based on recent correspondence with you, the U.S. EPA is willing to approve the above referenced document in anticipation of final resolution of all Agency comments. Enclosed with this letter are the outstanding comments on the SSP.

Discussions are ongoing regarding the modification of the ecological risk assessment process contained in the SSP. These discussions center around replacing the aquatic portion of the ecological risk assessment for Sauget Area 2 with the RCRA Krummrich Ecological Risk Assessment. If an agreement can be reached, an addendum to the SSP will be necessary to modify the scope and objectives of the ecological risk assessment work plan.

Pursuant to Section 2.2 of the November 24, 2000, Administrative Order on Consent, U.S. EPA conditionally approves the RI/FS Support Sampling Plan for the Sauget Area 2 Site. The conditions of approval requires the Sauget Area 2 Sites Group (Group) to address the comments in the enclosure, and resubmit the revised pages within 14 days of receipt of this letter. The Group should begin field activities as soon as practicable.

If you have any questions regarding this letter or the enclosure, please feel free to call me at (312) 886-4592.

Sincerely,



Mike Ribordy
Remedial Project Manager
Superfund Division

cc: Thomas Martin, USEPA
Terry Stanuch, USEPA
Sandra Bron, IEPA
Peter Barrett, CH2M HILL
Kevin de la Bruere, USFWS
Michael Henry, IDNR

ENCLOSURE

Comments on Revised RI/FS Support Sampling Plan Sauget Area 2 Site - St. Clair County, Illinois

Site 0 - After reviewing the historical aerial photographs for Sauget Area 2 Sites, the Group suggested that the actual waste disposal area at Site 0 was slightly larger than what had been defined. It appeared that two additional small areas were located northeast and southwest of former lagoons, possible indications of waste disposal activities in the past. In addition, a wet area was observed west of the lagoons based on the historical aerial photographs. It was suspected that the wet area could be connected or related to the lagoons.

At the March 7, 2002, meeting, it was agreed that the proposed soil gas survey at Site 0 would be extended to cover the three new areas. Volume 2A, Section 5.1.1.1 adequately discusses the 3 additional areas. However, Figure 5-2 in Volume 1 and Figure 3 in Volume 2A do not show these three areas, and the 200 by 200 ft. grid has not been superimposed on them. Please correct the two figures along with Table 2 in Volume 2A and the total number of soil gas samples for Site 0 on page 6-3 in Volume 1.

Volume 1, Section 6.9 Off-Site Soil Samples - This section references Figure 5-1 instead of Figure 5-3. Please make the correction.

Volume 1, Section 11.3.2.3 Toxicity Screen and Section 11.5.1 Identification of Potential Exposure Scenarios - The Sauget Area 2 Sites Group's (Group) December 18, 2001, Response to Comments, the Group agreed to use Class I standards in evaluating risks associated with site groundwater contamination. The April 15, 2002, revised RI/FS Support Sampling Plan still references Class II standards. Please make the correction.

Volume 1, Section 12.7.6.1 - Exposure Model Input Parameters - The only outstanding issue is the seasonal use factor for osprey. In order to resolve this issue, the Group has agreed to use a 100% SUF for osprey. Please make the correction on page 12-50.

Volume 2A, Section 3.1.7 Non-Aqueous Phase Liquid (NAPL) - The Group included a section on NAPLs as agreed to at the March 7, 2002, meeting. The text should also state that for

groundwater sampling (push point/geoprobe or bedrock), the presence of NAPL will be screened and samples of NAPL collected before the well is purged. NAPL samples will be collected using a top entry bailer for LNAPL, and a bottom entry bailer for DNAPL.

SURFACE WATER, SEDIMENT AND BIOTA SAMPLING PLAN

8.0 Surface Water, Sediment and Biota Sampling Plan

Surface water, sediment and ecological samples will be collected in the Mississippi River. Surface water and sediments will also be collected from the two ponds located at the Southern end of Site Q. Terrestrial samples of biota will be collected from each of the five Sites. Samples will be analyzed to determine the concentration of site-related constituents in these media and to provide information for the risk assessments. Surface water and sediment samples will be collected from the Mississippi River along three transects running parallel to the river bank at the following three locations: 1) downgradient of Site P, 2) downgradient of Sites O, R, S and the northern end of Site Q, and 3) downgradient of the southern end of Site Q.

The three sampling transects will be located 50, 150 and 300 feet from shore. The location of these sample transects are based on Mississippi River sediment samples collected by USEPA in October and November, 2000. The following results were identified in that sampling:

<u>Maximum Detected Concentration, ppb</u>	<u>Distance From Riverbank</u>		
	<u>50 to 100 Feet</u>	<u>150 Feet</u>	<u>315 Feet</u>
Total VOCs	22,000	6,758	3,360
Total SVOCs	11,410	11,500	ND

Sediment sample analytical results and sampling location maps are included at the end of this section.

Benthic macroinvertebrates will be sampled at each of the nine sampling locations. This data will be used to evaluate benthic community structure (species richness and biomass) to provide data for the sediment triad evaluation. Bioassays will be conducted on surface water and sediment samples to determine the toxicity, if any, of these environmental media to sensitive organisms.

Fish will be sampled in three areas of the Mississippi River associated with the Sites: 1) downgradient of Site P, 2) downgradient of Sites O, R, S and the northern end of Site Q, and 3)

the southern end of Site Q. A food source approach has been used to select fish for fish tissue analysis:

<u>Food Source</u>	<u>Fish</u>	<u>Trophic Level</u>	<u>Endpoint Organism</u>
Omnivore	Channel Catfish	Bottom Feeder	Fish
Plankton	Shad (Large)	Forager	Osprey
	Shad (Small)	Forager	Great Blue Heron
Detritus	Buffalo (Fillets)	Omnivore	Recreational Fisher

Small shad will be those fish ranging in size from approximately 4 inches to 8 inches in length. Large shad will be those fish greater than 8 inches in length.

These fish tissue samples, collected in plume discharge areas, will be used to determine the impact, if any, of groundwater discharge on higher trophic level organisms. Fish will also be sampled in reference areas upstream and in areas downstream of Sauget Area 2 in order to assess the potential for downstream migration of constituents.

Information collected as part of the Surface Water, Sediment and Ecological Sampling Plan will be used in the Human Health Risk Assessment and the Ecological Risk Assessment. With five disposal sites located adjacent to or near the east bank of the Mississippi River, the primary ecological exposure pathway is groundwater water discharge to surface water. Other exposure pathways include terrestrial organism exposure to site soils and aquatic organism exposure to water and sediments in on-site ponded areas. These exposure pathways will be included in the site conceptual model section of the Ecological Risk Assessment Work Plan.

Aquatic endpoint organisms to be evaluated in the ERA are: 1) benthic macroinvertebrate, 2) fish, 3) great blue heron (small fish predator) and 4) osprey (large fish predator). Terrestrial endpoint organisms that will be evaluated in the ERA are: 1) plants, 2) prairie vole (herbivore), 3) short-tailed shrew (vermivore) and 4) red fox (predator). Ponded area endpoint-organisms to be evaluated in the ERA are 1) benthic macroinvertebrate and 2) fish or amphibians, if fish are not present.

SOLUTIA - 162

May 18, 2004

DE-9J

CERTIFIED MAIL

RETURN RECEIPT REQUESTED

7001 0320 0006 1452 0429

Mr. Steven D. Smith
Solutia Inc.
P.O. Box 66760
St. Louis, MO 63166-6760

RE: Notice of Formal Dispute
Administrative Order on Consent
U.S. EPA Docket No. R8H-5-00-003
Solutia Inc.
ILD 000 802 702

Dear Mr. Smith:

On March 9, 2004, the United States Environmental Protection Agency (U.S. EPA) served Notice of Dispute pursuant to Section X.2 of the Resource Conservation and Recovery Act (RCRA), Administrative Order on Consent (AOC), U.S. EPA Docket No. R8H-5-00-003, effective May 3, 2000. In response, Solutia submitted the *CA750 Groundwater Migration Under Control Addendum* (CA750 Addendum) and other information on April 19, 2004, to demonstrate that hydraulic control of the groundwater contaminant plume has and is being maintained, and that all current exposures to contamination are under control. Submission of this report was a very important step toward resolving this dispute.

Based on our review of the April 19, 2004, CA750 Addendum, we believe that the groundwater contaminant plume is currently being adequately controlled. Solutia has been in compliance with Section VI.2 of the AOC since April 19, 2004. We are optimistic that Solutia will be able to remain in compliance in the future if construction of the slurry wall continues in a timely manner and the extraction wells continue to be pumped using the Record of Decision pumping rate look-up table assuming no barrier wall.

After conducting a complete analysis of the CA750 Addendum, U.S. EPA believes that the dispute has not been fully resolved and formally sets forth its written objection pursuant to Section X.3 of the AOC. Specifically, Solutia has not stabilized the migration of contaminated groundwater during certain time periods and has not demonstrated in a timely manner that the migration of contaminated groundwater is stabilized.

The specific points of the dispute, the basis for U.S. EPA's position, and matters which we consider necessary for determination are provided below.

Solutia Has Not Demonstrated That The Migration of Contaminated Groundwater Was Stabilized During Certain Time Periods By The Groundwater Migration Control System

Pumping at extraction wells EW-1, EW-2, and EW-3 initially began on July 15, 2003. However due a restriction on flow rates to the American Bottoms Regional Treatment Facility, Solutia did not begin pumping at the maximum design rate (approx. 2000 gpm) until October 22, 2003. Starting on that date, U.S. EPA evaluated the data provided in the CA750 Addendum to determine if Solutia adequately demonstrated that the migration of contaminated groundwater is stabilized.

Figure No. 1 of the CA750 Addendum depicts the extent of the slurry wall construction performed from September through December 2003¹. Construction of the slurry wall occurred in October 2003 at PZ-2E and in November 2003 at PZ-3E. The slurry wall had not been constructed at PZ-1S and PZ-4E upon submission of the CA750 Addendum. Therefore the slurry wall could only have directly cut-off groundwater flow in the vicinity of PZ-2E and PZ-3E by December 2003. Groundwater flow to the Mississippi River at PZ-1S and PZ-4E would not be cut-off by the slurry wall.

Figures of monthly daily average water level readings were provided in the CA750 Addendum from October 22, 2003, through April 11, 2004, and are evaluated below.

October - All piezometer (PZ) water levels (i.e., PZ-1S, PZ-2E, PZ-3E, and PZ-4E) exceed the surface water average level of the Mississippi River, indicating that groundwater flow was to the Mississippi River and that hydraulic control of the groundwater contaminant plume was not being maintained. *Apparent non-compliance = 9 days*

November - Due to rising water levels of the Mississippi River, PZ water levels were typically below the surface water average level of the Mississippi River. With construction of the slurry wall, hydraulic control at PZ-2E would be expected. For PZ-1S, PZ-3E, and PZ-4E, water levels exceeded the surface water average level of the Mississippi River on November 1 to 3, and November 15 to 17. On these dates, groundwater flow was to the Mississippi River and hydraulic control of the groundwater contaminant plume was not being maintained. *Apparent non-compliance = 6 days*

¹ Construction of the slurry wall was suspended in December 2003.

December - Widely fluctuating water levels of the Mississippi River resulted in PZ water levels above and below the surface water average level. With further construction of the slurry wall, hydraulic control at PZ-2E and PZ-3E would be expected. For PZ-1S and PZ-4E, water levels exceeded the surface water average level of the Mississippi River on December 3 to 9, December 21 and 22, and December 28, 30, and 31. On these dates, groundwater flow was to the Mississippi River and hydraulic control of the groundwater contaminant plume was not being maintained. *Apparent non-compliance = 12 days*

January - Water levels of the Mississippi River fluctuated but were generally falling through the month, resulting in PZ water levels above and below the surface water average level. No further construction of the slurry wall occurred and hydraulic control at PZ-2E and PZ-3E would be expected to continue. For PZ-1S and PZ-4E, water levels exceeded the surface water average level of the Mississippi River on January 8 to 17, January 23, and January 28 to 31. On these dates, groundwater flow was to the Mississippi River and hydraulic control of the groundwater contaminant plume was not being maintained. *Apparent non-compliance = 15 days*

February - Water levels of the Mississippi River were generally low but rose substantially beginning on February 20, resulting in PZ water levels above the surface water average level until February 21. No further construction of the slurry wall occurred and hydraulic control at PZ-2E and PZ-3E would be expected to continue. For PZ-1S and PZ-4E, water levels exceeded the surface water average level of the Mississippi River on February 1 to 13, and February 16 to 20. However, on February 12, 16, 17, 19, and 20, Solutia provided average daily water level readings at four additional piezometers, five monitoring wells, and the three extraction wells. This data showed that although river stage levels may have been lower than groundwater levels at PZ-4E, groundwater flow was to the extraction wells. Extraction wells were being pumped at their maximum rate during this period. From February 1 to 11, groundwater flow was to the Mississippi River (or Solutia did not demonstrate that flow was toward the extraction wells) and hydraulic control of the groundwater contaminant plume was not being maintained. *Apparent non-compliance = 11 days*

March and early-April - Water levels of the Mississippi River fluctuated but stayed high. No further construction of the slurry wall occurred and hydraulic control at PZ-2E and PZ-3E would be expected to continue. For PZ-1S and PZ-4E, water levels did not exceed the surface water average level of the Mississippi River. Throughout the period, groundwater flow was inward from the river and hydraulic control of the groundwater contaminant plume was being maintained. *Apparent non-compliance = 0 days*

Total apparent non-compliance = 53 days

Pumping rates for the extraction wells were insufficient to stabilize the migration of contaminated groundwater during low and falling river levels. Pumping rates were calculated based on various standards throughout the October 2003 to April 2004 time period as described in the CA750 Addendum.

From October 22 to November 24, pumping rates were derived from the Record of Decision look-up table assuming no barrier wall, to a maximum of 600 gpm per well. Because of the low river levels, a lag time in lowering the water table during initial pumping, and the slow PZ water level response from pumping relative to falling river levels, fifteen (15) days of apparent non-compliance were noted.

Beginning on November 25 and extending to January 21, Solutia modified the pumping rates to keep the average groundwater level in each PZ to +/- 0.5-feet of surface water level. Due to falling river levels, PZ groundwater levels in December and January were as high as 2-feet above the surface water level. This pumping regime was insufficient to maintain the water level standard and hydraulic control of the groundwater contaminant plume. Twenty-two (22) days of apparent non-compliance were noted.

From January 22 to January 29, Solutia modified the pumping rates to keep the average groundwater level in each PZ to 0 to -1 foot of surface water level. However due to falling river levels, PZ groundwater levels were as high as 2-feet above the surface water level. This pumping regime was insufficient to maintain the water level standard and hydraulic control of the groundwater contaminant plume. Three (3) days of apparent non-compliance were noted.

Extraction well EW-2 failed on January 29 and the extraction system did not resume operation until February 3. At that time, Solutia began operating the extraction system at its maximum capacity (approx. 2200 gpm) through March 4. Pumping at the maximum rate finally resulted in hydraulic control of the groundwater contaminant plume on or about February 12. Thirteen (13) days of apparent non-compliance were noted.

The three lines of evidence used from October 22, 2003, to January 31, 2004, in the CA750 Addendum are insufficient to demonstrate that the migration of contaminated groundwater is stabilized. The three lines of evidence are:

- 1 - Surface water level greater than groundwater level
- 2 - Surface water level greater than pumping water level
- 3 - Groundwater level greater than pumping water level

As noted above, the surface water level is not always greater than the groundwater level (Line of Evidence 1) and these are the days of apparent non-compliance. Regarding Line of Evidence 2, it is noted that they were four periods when pumping water levels were at or above the river level. Also no data is provided to identify the capture zone of each extraction well for its given pumping rate. It is not apparent from PZ data that hydraulic control of the contaminant plume was being maintained by the extraction wells. Pumping water levels alone without additional information are insufficient to conclude the migration of contaminated groundwater is stabilized. This line of evidence is even weaker given that the slurry wall, which would be expected to assist in hydraulic control, was only partially constructed during this time period.

U.S. EPA believes that Line of Evidence 3 is not persuasive. Since the extraction wells are lined up with the piezometers parallel to the river, their water levels would be expected to be similar with no pumping. With pumping, water levels would obviously be lower in the extraction wells. However, no data is provided to identify the capture zone of each extraction well for its given pumping rate.

U.S. EPA also evaluated the well logs and construction records for the B-series, GM-series, PZ-series, and EW-series wells/piezometers. Both the B-series and GM-series wells are screened in a different manner than the newer PZ-series and EW-series wells/piezometers. Their screens lengths are only 10 to 20-feet, with a position near the top of the 70 to 85-foot screened PZ-series and EW-series. Because of the varying screen lengths/positions and known vertical gradients, it is likely that the B-series and GM-series water levels are not directly comparable to the PZ-series and EW-series water levels.

The Demonstration That The Migration Of Contaminated Groundwater Is Stabilized Was Not Made In A Timely Manner

Section VI.2 of the AOC requires Solutia to demonstrate by January 1, 2002, through submitting an Environmental Indicators (EI) Report and by performing any other necessary activities, that the migration of contaminated groundwater at or from the Facility is stabilized. That is, the migration of all groundwater known or reasonably suspected to be contaminated with hazardous wastes or hazardous constituents above acceptable levels is stabilized to remain within any existing areas of contamination as defined by monitoring locations designated at the time of the demonstration. In addition, Solutia must show that any discharge of groundwater to surface water is either insignificant or shown to be currently acceptable according to an appropriate interim assessment. Solutia must collect monitoring

and measurement data in the future as necessary to verify that migration of any contaminated groundwater is stabilized.

The initial EI Report was provided to U.S. EPA on December 17, 2002. In a letter dated January 16, 2003, U.S. EPA notified Solutia that the EI Report was insufficient to permit a determination that the migration of contaminated groundwater at or from the Facility had been stabilized. U.S. EPA enclosed comments that provided deficiencies in the report. A meeting was held on March 13, 2003, to discuss the deficiencies. U.S. EPA stated at the meeting that construction of the groundwater migration control system was necessary to stabilize the migration of contaminated groundwater.

In an October 28, 2003, e-mail, EPA requested an updated EI Report. Because the three extraction wells were now allowed to pump near their maximum rate, U.S. EPA believed that Solutia might be capable of demonstrating that the migration of contaminated groundwater is stabilized. The EI report was expected to incorporate all the necessary data to make that demonstration. Necessary data included particle tracking modeling under various pumping and river level scenarios, a discussion of the interim groundwater remedy and its effects on capturing the contaminant plume, updated piezometric and chemical data for groundwater, available surface water and sediment data from the Mississippi River, and a monitoring program. An updated EI report was not timely provided to U.S. EPA.

On March 9, 2004, U.S. EPA served Notice of Dispute that Solutia was in violation of the AOC for failure to adequately demonstrate that groundwater migration is stabilized. A meeting was held on March 18, 2004, and Solutia agreed to submit an Addendum to the EI report to demonstrate that migration of contaminated groundwater is stabilized. The agreements made at the meeting were detailed in a March 30, 2004, letter from U.S. EPA. The Addendum was submitted on April 19, 2004.

The demonstration that migration of contaminated groundwater is stabilized was due on April 1, 2002. During the period from April 1, 2002, to July 15, 2003, Solutia coordinated with the CERCLA program to complete an interim remedy to control the discharge of contaminated groundwater to the Mississippi River. The approach for coordinating the CERCLA remedy with the RCRA AOC is detailed in our letter of December 17, 2001, from Messrs. Robert Springer and William Muno. The CERCLA remedy was partially implemented on July 15, 2003, when the three extraction wells began pumping groundwater at a low rate. Solutia was not in violation of Section VI.2 of the RCRA AOC during that period of time.

Furthermore, Solutia has made a substantial effort to stabilize the migration of contaminated groundwater since October 22, 2003.

Although Solutia did not submit the required EI Report until April 19, 2004, and its adequacy is questionable in part, we are withdrawing our dispute over compliance during portions of that time period where Solutia adequately demonstrated in the EI Report that the migration of contaminated groundwater was stabilized.

Therefore, the days of non-compliance subject to this formal dispute notification are 98 days (July 16, 2003, to October 21, 2003) plus 53 days (certain periods from October 22, 2003, to February 11, 2004), or a total of 151 days of non-compliance.

Pursuant to Section IX.2 of the AOC, Solutia is subject to \$5,000 per day in stipulated penalties for failure to adequately demonstrate that groundwater migration is stabilized.

U.S. EPA and Solutia have 21 days for a good faith attempt to resolve the dispute through formal negotiations. Solutia may request a conference with appropriate senior management to discuss the dispute.

Sincerely yours,

Kenneth S. Bardo

Kenneth S. Bardo, Project Manager
Corr

cc:

COMPLETE THIS SECTION ON DELIVERY	
A. Received by (Please Print Clearly) <i>K. Bardo</i>	B. Date of Delivery <i>5-25</i>
C. Signature <i>[Signature]</i>	<input checked="" type="checkbox"/> Agent <input type="checkbox"/> Addressee
D. Is delivery address different from item 1? <input type="checkbox"/> Yes <input type="checkbox"/> No If YES, enter delivery address below:	
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4. Restricted Delivery? (Extra Fee) <input type="checkbox"/> Yes <input type="checkbox"/> No	
Article Addressed to: <i>Steve Smith Solutia Inc. P.O. Box 66760 St. Louis, MO 63166-6760</i>	
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bcc: Gerald Phillips, WPTD
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Richard Murawski, ORC
Thomas Martin, ORC
Nabil Fayoumi, RRS 1
DE-9J:KBARDO:6-7566:kb:5/18/04

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SOLUTIA - 163

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

**RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)**

Current Human Exposures Under Control

Facility Name: Solutia Inc.
Facility Address: 500 Monsanto Ave., Sauget, IL 62206-1198
Facility EPA ID #: ILD 000 802 702

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

 X If yes - check here and continue with #2 below.
 If no - re-evaluate existing data, or
 if data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)
Page 2

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"**¹ above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	X			Numerous VOCs and SVOCs (see table below)
Air (indoors) ²	X			VOCs evaluated in air quality sampling program; VOCs in soil vapor exceed target concentrations in seven on-site areas.
Air (outdoors)	X			VOCs evaluated in air quality sampling program; VOCs in subsurface soil vapor exceed OSHA PELs at some locations.
Surface Soil (e.g., <2 ft)	X			Benzene, chlorobenzene, dichlorobenzenes, trichlorobenzene, and PCBs. All contaminated soil at the facility covered with asphalt, concrete, or a minimum of 1-foot gravel.
Subsrf. Soil (e.g., >2 ft)	X			Benzene, chlorobenzene, dichlorobenzenes, trichlorobenzene, and PCBs. Contaminated water table occasionally within 10-feet of ground surface.
Surface Water		X		Mississippi River currently protected by a three-well extraction and slurry wall system.
Sediment		X		Mississippi River currently protected by a three-well extraction and slurry wall system.

—— If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

X If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

—— If unknown (for any media) - skip to #6 and enter "IN" status code.

¹ "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

² Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

**Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)**

Page 3

Rationale and Reference(s):

References:

- *Administrative Order on Consent*. U.S. EPA Docket No., R8H-5-00-003. May 3, 2000.
- *Description of Current Conditions, W.G. Krummrich Plant, Sauget, Illinois*. August 1, 2000.
- *Description of Current Conditions, W.G. Krummrich Plant, Sauget, Illinois, Volumes 2 and 3*. September 1, 2000.
- February 9, 2001, letter from EPA to Solutia providing and interpreting sediment sampling results for the October/November 2000 sampling event in the Mississippi River.
- *Ecological Risk Assessment for WG Krummrich Plant, Sauget, St. Clair County, Illinois*. June 1, 2001. Menzie-Cura & Associates, Inc.
- November 30, 2001, letter from Solutia to EPA providing a design for a well extraction system to be placed at the edge of the Mississippi River on Solutia property to capture contaminated groundwater from the Krummrich Plant and other Superfund areas.
- *Groundwater Discharge Control System, W.G. Krummrich, Sauget, Illinois, Design Basis and Response to Comments*. January 28, 2002.
- *Administrative Order for Remedial Design and Interim Remedial Action*. U.S. EPA Docket No. V-W-02-C-716. September 30, 2002.
- October 29, 2002, letter from Solutia to EPA providing the conceptual site model for the human health environmental indicator.
- November 18, 2002, e-mail from EPA to Solutia providing comments on the conceptual site model.
- *Focused Feasibility Study Volume 1, Interim Groundwater Remedy, Sauget Area 2 Sites O, Q, R, and S*. July 3, 2003.
- *CA 725 Current Human Exposures Under Control, W.G. Krummrich Plant, Sauget, IL, Volumes I, II, and III*. August 2003. URS Corporation.
- *Results of RCRA CA-725 Environmental Indicators Air Quality Sampling*. December 10, 2003. TRC Environmental Corporation.
- *CA 750 Groundwater Migration Control Addendum, W.G. Krummrich Plant, Sauget, Illinois*. April 19, 2004. Solutia Inc.

Rationale: Groundwater - A large groundwater contaminant plume containing VOCs and SVOCs is present beneath the entire facility and extends westward one-half mile to the Mississippi River. The plume is approximately 3,500-feet wide and 7,000-feet long. It is controlled at its westernmost extent, before it can discharge to the Mississippi River, by a slurry barrier wall and three-well extraction system. Collected groundwater is routed to the American Bottoms Regional Treatment Facility. Maximum contaminant concentrations detected in the plume at and from the facility and corresponding Illinois EPA TACO groundwater remediation objectives are:

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Groundwater Contaminant	Maximum Concentration (ppb)	Illinois EPA TACO Groundwater Remediation Objective (ppb)
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<i>Volatile Organics</i>		
Acetone	22,000	700
Benzene	1,600,000	5
Chlorobenzene	350,000	100
1,2-DCA	14,000	5
1,2-DCE	420	70
Ethylbenzene	29,000	700
Methylene chloride	680	5
4-methyl-2-pentanone	3,100	560
1,1,1-TCA	560	200
Toluene	71,000	100
Xylenes	150,000	10,000
Vinyl chloride	350	2

<i>Semi-volatile Organics</i>		
Aniline	62,000	23
4-chloroaniline	25,000	28
2-chlorophenol	540,000	35
Dichlorobenzenes	23,000,000	75
2,4-dichlorophenol	340,000	21
Methylphenols	280,000	350
2-nitroaniline	1,100	6.3
Nitrobenzene	14,000	3.5
Naphthalene	86,000	140
Pentachlorophenol	18,000	1
Phenol	1,100,000	100
1,2,4-trichlorobenzene	1,400	70
2,4,6-trichlorophenol	2,700	10

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Air (indoors and outdoors) - Indoor air, ambient air, and soil vapor were sampled from March 31 through April 2, 2003, and again from August 19 through September 6, 2003. Indoor air sampled from four buildings was found to contain benzene, chlorobenzene, dichlorobenzenes, methylene chloride, MIBK, MEK, 1,1,1-TCA, and acetone. However, OSHA PELs were not exceeded during either sampling event.

Ambient air sampling during both sampling episodes detected methylene chloride, chlorobenzene, acetone, 1,4-dichlorobenzene, and 1,1,1-trichloroethane. None of the ambient air concentrations exceeded a HQ of 1 or 10^{-4} cancer risk under a worker exposure scenario.

Soil vapor was sampled approximately 5-feet below the surface at 18 locations. MIBK, 1,1,1-TCA, PCE, vinyl chloride, MEK, TCE, carbon disulfide, cis-1,2-DCE, chlorobenzene, dichlorobenzenes, chloroform, benzene, acetone, nitrobenzene, and aniline were detected. Two sample locations (SVP-10 and SVP-14) at the chlorobenzene production area and at the ketone manufacturing area, contained significant MIBK, benzene, chlorobenzene, and 1,4-dichlorobenzene contamination. Benzene concentrations were 680 and 1100 ppbv (OSHA PEL = 1000 ppbv); MIBK was as high as 72,000ppbv (OSHA PEL = 200,000 ppbv); chlorobenzene was as high as 31,000 ppbv (OSHA PEL = 75,000 ppbv); and 1,4-dichlorobenzene was as high as 14,000 ppbv (OSHA PEL = 10,000 ppbv).

The target shallow soil gas concentrations for soil vapor samples were exceeded for MIBK, chlorobenzene, dichlorobenzenes, and benzene at the chlorobenzene production area and at the ketone manufacturing area. The target concentrations are screening levels for the potential intrusion of the compounds into overlying or immediately adjacent buildings.

No benzene was detected in soil vapor along the benzene pipeline from the river to the facility. None or only trace amounts of contaminants were detected in soil vapor at four locations at the facility perimeter indicating little, if any, off-site soil vapor contamination.

Surface and Subsurface Soil - Approximately 70% (52 of 76) of the on-site soil boring sample locations from closure investigations have significant organic contamination at some depth (*Description of Current Conditions*, September 1, 2000, Appendices 16 and 17, and Figure 20). Closure investigations show that the Illinois EPA Tier 1 TACO Industrial-Commercial Criteria for soil are exceeded in the surface (0' - 3') and subsurface (3' - 10') soil at 34 boring locations for:

Benzene - inhalation exposure route for industrial/commercial and construction worker scenario and ingestion exposure route for industrial/commercial scenario;

Chlorobenzene - inhalation exposure route for industrial/commercial and construction worker scenario and ingestion exposure route for construction worker scenario;

1,2 and 1,4-dichlorobenzene - inhalation exposure route for industrial/commercial and construction worker scenario;

1,2,4-trichlorobenzene - inhalation exposure route for industrial/commercial and construction worker scenario and ingestion exposure route for construction worker scenario; and

PCBs - ingestion exposure route for industrial/commercial and construction worker scenario.

Surface water and sediment - The only surface water at or near the facility is the Mississippi River which lies approximately one-half mile west of the Lot F portion of the facility. Site contaminants were historically detected in the river water and sandy sediment approximately 150' from the east riverbank located just west of Lot H (CERCLA Site R). The contamination was determined to pose an unacceptable ecological risk.

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Pursuant to the CERCLA Administrative Order for Remedial Design and Interim Remedial Action, a three-well extraction system was installed in the summer of 2003 on Lot H just above the east riverbank of the Mississippi River. Required slurry wall construction began in September 2003 and is partially completed. The groundwater barrier/control system is currently maintaining hydraulic control of the groundwater, effectively capturing the contaminant plume before it discharges to the Mississippi River. Captured groundwater is routed and treated at the American Bottoms Regional Treatment Facility and discharged to the Mississippi River pursuant to an NPDES permit.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food ³
Groundwater	No	No	No	Yes	No	No	No
Air (indoors)	No	Yes	No	No	No	No	No
Air (outdoors)	No	Yes	No	Yes	No	No	No
Soil (surface, e.g., <2 ft)	No	No	No	Yes	No	No	No
Soil (subsurface, e.g., >2 ft)	No	No	No	Yes	No	No	No
Surface water	No	No	No	No	No	No	No
Sediment	No	No	No	No	No	No	Yes

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated" as identified in #2 above.
2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

- ___ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).
- X If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

³ Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

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_____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

References:

- *Administrative Order on Consent*. U.S. EPA Docket No., R8H-5-00-003. May 3, 2000.
- *Description of Current Conditions, W.G. Krummrich Plant, Sauget, Illinois*. August 1, 2000.
- *Description of Current Conditions, W.G. Krummrich Plant, Sauget, Illinois, Volumes 2 and 3*. September 1, 2000.
- November 30, 2001, letter from Solutia to EPA providing a design for a well extraction system to be placed at the edge of the Mississippi River on Solutia property to capture contaminated groundwater from the Krummrich Plant and other Superfund areas.
- *Groundwater Discharge Control System, W.G. Krummrich, Sauget, Illinois, Design Basis and Response to Comments*. January 28, 2002.
- *Administrative Order for Remedial Design and Interim Remedial Action*. U.S. EPA Docket No. V-W-02-C-716. September 30, 2002.
- October 29, 2002, letter from Solutia to EPA providing the conceptual site model for the human health environmental indicator.
- November 18, 2002, e-mail from EPA to Solutia providing comments on the conceptual site model.
- *Focused Feasibility Study Volume 1, Interim Groundwater Remedy, Sauget Area 2 Sites O, Q, R, and S*. July 3, 2003.
- *CA 725 Current Human Exposures Under Control, W.G. Krummrich Plant, Sauget, IL, Volumes I, II, and III*. August 2003. URS Corporation.
- October 13, 2003, letter from Solutia to EPA providing a map where augmentation of gravel thickness is necessary to ensure a minimum 12-inch gravel layer.
- *Results of RCRA CA-725 Environmental Indicators Air Quality Sampling*. December 10, 2003. TRC Environmental Corporation.
- *Gravel Addition Implementation and Confirmation, Solutia Inc., W.G. Krummrich Facility, Sauget, IL*. December 10, 2003. URS Corporation.
- *Human Health Risk Assessment, Sauget Area 2, Sauget, Illinois, Volumes I and II*. August 31, 2003. ENSR Corporation.
- *CA 750 Groundwater Migration Control Addendum, W.G. Krummrich Plant, Sauget, Illinois*. April 19, 2004. Solutia Inc.
- April 19, 2004, letter from Solutia to EPA providing additional information on the risk analysis performed for the recreational fisher and trespassing teenager exposure scenarios.

Rationale: Groundwater - The groundwater contaminant plume is controlled by a slurry wall and captured by a system of three extraction wells. The groundwater barrier/control system currently captures contaminants before they discharge to the Mississippi River. The wells and barrier wall maintain hydraulic control of the plume. Upgradient of the extraction wells, the plume underlies only open land and industrial facilities. There are no residences in the area of the groundwater contaminant plume.

The facility contaminant plume commingles with other contaminant plumes from surrounding industries and historical disposal areas. There are no known water wells located within the plume boundary; contaminated groundwater is not used at or near the facility. Potable water is supplied to area industry and residents by a public water supply system that obtains its water from a surface water intake in the Mississippi River located upstream of the facility.

Because of heavy industry and widespread groundwater contamination, the Villages of Cahokia and Sauget

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have local groundwater ordinances enacted in June 2000, and October 1999, respectively, that prohibit the use of groundwater as a potable water supply by the installation or use of potable water supply wells or by any other method. "Potable water" is defined in the ordinances as any water used for human or domestic consumption, including, but not limited to, water used for drinking, bathing, swimming, washing dishes, garden or lawn watering, or preparing foods.

The interim groundwater remedy and local ordinances eliminate the complete pathway between groundwater contamination and human receptors. Exposures are not reasonably expected under the current land and groundwater use conditions.

The water table is seasonally present within 10-feet or less of the ground surface at the facility. Significant concentrations of benzene (up to 1,600 ppm), chlorobenzene (up to 350 ppm), and dichlorobenzenes (up to 40,000 ppm) are present in shallow water table beneath the facility. Construction workers may come into contact with contaminated groundwater when working in deep excavations (10-feet +) involving buried piping at the facility. The exposure pathway is potentially complete for construction workers.

Air (indoors and outdoors) - Indoor air exposures are complete based on the air quality sampling program. VOCs were detected in four buildings but were below the OSHA PELs. Soil vapor target gas concentrations were exceeded, indicating that intrusion of significant VOC contamination into buildings is possible.

Outdoor air exposures are complete for construction workers based on the air quality sampling program. Specifically, the OSHA PEL for benzene was exceeded in soil vapor at 5-feet bgs at the ketone manufacturing area and the OSHA PEL for 1,4-dichlorobenzene was exceeded in soil vapor at 5-feet bgs at the chlorobenzene production area. Construction workers working in confined spaces underground or in deep excavations may be exposed to unacceptable levels of benzene and/or 1,4-dichlorobenzene.

Outdoor air exposure to workers is complete based on ambient air data and the potential for volatilization of VOCs from near-surface groundwater to air. On-site ambient air monitoring detected five VOCs. Sources of VOCs in ambient air are incidental releases from production units and volatilization of VOCs from near-surface groundwater that is heavily contaminated with VOCs.

Surface and subsurface soil - Most of the facility where contaminated surface soil has been found is overlain by buildings, roads, and industrial process units. Therefore, the surface soil is overlain by concrete or asphalt. The remainder of the facility is overlain by gravel. The depth of gravel was measured and amended to ensure that gravel thickness was a minimum of 12-inches to prevent incidental exposure. Placement of additional gravel and in some areas, asphaltic concrete, began on November 3, 2003 and was completed on December 5, 2003. Physical barriers over the surface soil eliminate the complete pathway between surface soil and human receptors. Exposures are not reasonably expected under the current land and groundwater use conditions.

Construction workers may come into contact with contaminated surface and subsurface soil when working in excavations that may be required at the facility to repair buried piping. These soils have locally elevated concentrations of benzene, chlorobenzene, dichlorobenzenes, trichlorobenzene, and PCBs that exceed inhalation and ingestion exposure routes for an industrial scenario. The exposure pathway is potentially complete for construction workers.

Surface Water and sediment - The pathway between contaminated groundwater and surface water/sediment in the Mississippi River has been minimized by the installation of the three-well extraction and barrier wall system along the eastern riverbank. The groundwater barrier/control system is designed to collect contaminated groundwater before it can discharge to the Mississippi River. The partially-completed slurry wall is expected to be completed in November 2004.

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Contaminated river sediment from the historical discharge of contaminated groundwater has been identified. A baseline human health risk assessment was performed to assess risks from contaminated sediment and fish consumption under a recreational fisher and trespassing teenager scenario.

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **"significant"**⁴ (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

 X If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

 If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

 If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

References:

- *Description of Current Conditions, W.G. Krummrich Plant, Sauget, Illinois.* August 1, 2000.
- *Description of Current Conditions, W.G. Krummrich Plant, Sauget, Illinois, Volumes 2 and 3.* September 1, 2000.
- October 29, 2002, letter from Solutia to EPA providing the conceptual site model for the human health environmental indicator.
- November 18, 2002, e-mail from EPA to Solutia providing comments on the conceptual site model.
- *CA 725 Current Human Exposures Under Control, W.G. Krummrich Plant, Sauget, IL, Volumes I, II, and III.* August 2003. URS Corporation.
- *Results of RCRA CA-725 Environmental Indicators Air Quality Sampling.* December 10, 2003. TRC Environmental Corporation.
- *Human Health Risk Assessment, Sauget Area 2, Sauget, Illinois, Volumes I and II.* August 31, 2003. ENSR Corporation.

⁴ If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

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- April 19, 2004, letter from Solutia to EPA providing additional information on the risk analysis performed for the recreational fisher and trespassing teenager exposure scenarios.

Rationale:

Groundwater - Risks posed by exposure to construction workers who may come into contact with contaminated groundwater during deep intrusive activities is controlled by an excavation permit program. An excavation permit must be obtained before any intrusive activities are allowed at the facility. Solutia's Environmental, Safety, and Health Department issues a written permit for any intrusive work based on all available subsurface information, including historical groundwater data. A written excavation procedure (revised July 2003) is provided in Volume III, Attachment D of the *CA 725 Current Human Exposures Under Control, W.G. Krummrich Plant, Sauget, IL*, (August 2003). Additional sampling and analyses may be conducted to assess the potential hazards. The permit may require workers to wear certain personal protective equipment and conduct monitoring (almost always required) based on the conditions expected to be encountered in the excavation area. Workers are also required to have the appropriate health and safety training and are familiar with hazard recognition and response measures.

Air (indoors and outdoors) - Although indoor air exposures are occurring, exposures are not expected to be significant. For example, the air quality sampling program did not detect any VOC concentrations in buildings that exceeded their applicable OSHA PEL. Also, any vapor intrusion into on-site buildings is not expected to be significant because of their type of construction and ventilation systems.

The majority of enclosed buildings on-site are plant control room structures.. The buildings have all been replaced over the past several years and the new structures have elevated floor slabs (2-feet above surrounding grade). In addition, the buildings are equipped with high volume filtered air exchange (HVAC) systems that maintain a small positive pressure in the building. Details of the foundation and HVAC systems are provided in Attachment B of the *CA 725 Current Human Exposures Under Control, W.G. Krummrich Plant, Sauget, IL, Volumes II* (August 2003). Because of this design, its is unlikely that these buildings would be affected by the intrusion of organic vapors from subsurface sources.

The four older plant buildings that were sampled do not have the high volume air exchange present in the newer buildings and they are routinely occupied by workers. Two of the buildings are also located in areas of heavily impacted groundwater and one building has a basement. Indoor air samples were analyzed for VOCs and SVOCs; no concentrations exceeded their OSHA PEL.

Soil vapor exceeded target (screening) concentrations at five locations. This screening process is only relevant as an indicator of possible intrusion into buildings. Only one sample location was located in the immediate proximity to a building. The location, SPV-6, is immediately across the street from the BK office building and had PCE above its screening level. However, PCE was not detected in the indoor air samples.

Although outdoor air exposures may occur under a worker and construction worker scenario, exposures are not expected to be significant⁵. Risks posed by exposure to construction workers who may encounter contaminated soil vapor during deep intrusive activities is controlled by an excavation permit program. An

⁵ Because of the dynamic nature of VOCs in ambient air due to varying site operations, weather, seasons, groundwater levels, groundwater contaminant concentrations, etc., it is imperative that an ambient air monitoring program be developed and implemented to assure that the data and assumptions provided in this determination are correct. Solutia must continue to demonstrate that ambient air exposure is insignificant through continual evaluation of this determination based on future ambient air data.

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excavation permit must be obtained before any intrusive activities are allowed at the facility. Solutia's Environmental, Safety, and Health Department issues a written permit for any intrusive work based on all available subsurface information, including data from the air quality sampling program. A written excavation procedure (revised July 2003) is provided in Volume III, Attachment D of the *CA 725 Current Human Exposures Under Control, W.G. Krummrich Plant, Sauget, IL*, (August 2003). Additional sampling and analyses may be conducted to assess the potential hazards. The permit may require workers to wear certain personal protective equipment and conduct monitoring (almost always required) based on the conditions expected to be encountered in the excavation area. Workers are also required to have the appropriate health and safety training and are familiar with hazard recognition and response measures.

Significant VOC concentrations were detected in soil vapor at sample locations SVP-13A, SVP-7A, SVP-14, and SVP-10. An ambient air sample was taken at SVP-13A on August 20, 2003. Acetone, chlorobenzene, and 1,1,1-TCA were detected but were calculated to pose an insignificant risk under an industrial scenario. In addition, this area is isolated with no production units or buildings nearby where workers might be exposed.

Location SVP-7A is at the CCB building where the firehouse and maintenance shop are located. Acetone, benzene, chlorobenzene, and methylene chloride were detected in indoor air but were well below the corresponding OSHA PEL. Outdoor air at the building intake detected only trace (<4 ppbv) amounts of the VOCs. An ambient air sample located approximately 1000' to the east detected only trace amounts of acetone, chlorobenzene, and 1,4-dichlorobenzene. VOCs in ambient air pose an insignificant risk in this area.

The area at SVP-14 is overlain by tanks, asphalt, and concrete. The nearest gravel surface is approximately 150' to the north and east. The presence of asphalt and concrete is expected to minimize or prevent worker exposure to the release of VOCs from soil vapor into ambient air.

The area at SVP-10 is covered with at least 12" of gravel. The area immediately to the west and north is covered by roadways or production areas paved with asphalt and concrete. The closest worker exposure point to the gravel area and SVP-10 is approximately 100'. The working area is paved and expected to minimize or prevent worker exposure to the release of VOCs from soil vapor into ambient air. OSHA monitoring is performed at the chlorobenzene production area near SVP-10. Personnel monitoring has not detected any exceedances of OSHA PELs.

Surface and subsurface soil - Risks posed by exposure to construction workers who come into contact with contaminated surface and subsurface soil is controlled by an excavation permit program. An excavation permit must be obtained before any intrusive activities are allowed at the facility. Solutia's Environmental, Safety, and Health Department issues a written permit for any intrusive work based on all available subsurface information, including recent closure and RFI data. A written excavation procedure (revised July 2003) is provided in Volume III, Attachment D of the *CA 725 Current Human Exposures Under Control, W.G. Krummrich Plant, Sauget, IL*, (August 2003). Additional sampling and analyses may be conducted to assess the potential hazards. The permit may require workers to wear certain personal protective equipment and conduct monitoring (almost always required) based on the conditions expected to be encountered in the excavation area. Workers are also required to have the appropriate health and safety training and are familiar with hazard recognition and response measures.

Sediment - The baseline human health risk assessment calculated the potential risks and hazard index (HI) for the Mississippi River recreational fisher and trespassing teenager scenarios. They are within or below the target risk range of 10^{-6} and 10^{-4} and below the target HI of 1.

In addition, Illinois has issued a fish advisory for the consumption of carp and channel catfish for the entire

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Mississippi River. In the area of the former discharge of contaminated groundwater to the Mississippi River, access to potentially contaminated sediment is limited. A locked gate and fencing prevents access to Site R and the river. A rip rap revetment and steep slope further restricts access to the river bank below Site R. High river velocity also limits access to the water. In conclusion, exposures to the recreational fisher and trespassing teenager are minimized due to access restrictions and a fish advisory, and potential exposures do not pose an unacceptable risk.

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s):

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6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

 X YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Solutia Inc. facility, EPA ID # ILD 000 802 702, located at Sauget, Illinois under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

 NO - "Current Human Exposures" are NOT "Under Control."

 IN - More information is needed to make a determination.

Completed by

(signature)

Kenneth S. Bardo

Date

May 26, 2004

(print)

Kenneth S. Bardo

(title)

Environmental Scientist

Supervisor

(signature)

George Hamper

Date

Phoema Sundal
5/26/04
May 26, 2004

(print)

George Hamper

(title)

Section Chief

(EPA Region or State)

EPA Region 5

Locations where References may be found:

RCRA 7th Floor File Room, EPA Region 5 Office, 77 W. Jackson Blvd., Chicago, IL

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FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

ILLINOIS FISH AND YOUR HEALTH

A Guide to Your Health

Fish are nutritious, but some fish contain chemicals such as polychlorinated biphenyls (PCBs), chlordane and methyl mercury. These chemicals get into the water fish live in and the food they eat, and over time they can build up to levels that may cause health effects in people who eat the fish. It is important to keep exposure to these chemicals as low as possible. The Illinois fish advisory helps you plan what sport fish to eat as well as how often they can be eaten. *The fish advisory is not intended to discourage you from eating fish, but should be used as a guide to eating fish that are low in contaminants.*

Statewide Methyl Mercury Advisory

Since 2002, the Illinois sport fish meal advice has been presented in an expanded format. Previously, advisories based on all contaminants in fish were found in one table. Due to a more restrictive approach for methyl mercury in fish, a general state-wide advisory for predator fish is needed for women of childbearing age and children. In addition, a second table lists those waters where stricter advice for methyl mercury is necessary. **This does not mean that fish have become more contaminated with methyl mercury, only that recent studies have shown that methyl mercury is more toxic than previously thought.**

Health Benefits of Eating More Fish

Eating fish is good for you! When properly prepared, fish provide many health benefits. Many doctors suggest eating one-half pound of fish each week to help prevent heart disease. In fact, the American Heart Association recommends eating two to three fish meals per week. The benefits of eating fish include:

- ✧ Almost any kind of fish may have real health benefits when it replaces a high-fat source of protein in the diet. Possible health effects associated with high-fat diets include heart disease, high blood pressure, diabetes, and several forms of cancer.
- ✧ Fish offer high-quality protein with fewer calories than a similar-sized portion of meat. For example, both catfish and ground beef are about 18% protein. However, an 8-ounce meal of the catfish will have only about 232 calories, while the regular ground beef will have about 640 calories.
- ✧ Freshwater and saltwater fish alike are both low in sodium and good sources of potassium, vitamins, and other minerals.
- ✧ Fish are generally low in cholesterol and saturated fats, which have been associated with high blood pressure and heart disease. Eating fish regularly may lower the levels of cholesterol and saturated fats in your body.
- ✧ Scientific research has revealed beneficial roles of certain fish oils in nutrition and general health. While the benefits of fish on nutrition are still being studied, much of the current research is focused on various kinds of beneficial fats in fish, particularly a kind called omega-3 fatty acids which are in some fish and fish oils. Some studies have indicated that these fatty acids play an important role in fetal development, and also have favorable effects on health conditions such as hardening of the arteries (atherosclerosis), high levels of cholesterol, high blood pressure, and perhaps even arthritis. Note that atherosclerosis, high blood pressure, and obesity are the three major diet-related factors which increase the risk of developing coronary heart disease the cause of nearly half of all deaths in the United States today. Also, one in five Americans has a problem with atherosclerosis or high blood pressure.

Health Risks

Eating contaminated fish does not necessarily mean that you will experience health effects. The health problems that may result from chemicals that can build up in fish range from small changes that are hard to detect to birth defects and cancer. The most sensitive of these possible health effects are small changes in infant measurements, such as low birth weights (caused by PCBs), and small changes in the normal physical or mental development of infants and children (caused by PCBs, chlordane, and methyl mercury). Therefore, the meal advice contained in the following tables is primarily aimed at protecting mothers and their children. If you follow the guidance of the fish advisories, you will keep exposure to these chemicals low for both you and your children.

Cleaning and Cooking

Many chemicals are found at higher levels in the fat of the fish. You can reduce the amount of these chemicals and your exposure by properly trimming, skinning and cooking your catch. Cooking does not destroy chemicals in fish, but heat from cooking melts some of the fat in fish and allows some of the contaminated fat to drip away. Do not use the drippings to prepare broth, sauce, chowder or soup. **These cleaning precautions will not reduce the amount of mercury in fish.** Mercury is found throughout a fish's muscle tissue (the part you eat) rather than in the fat and skin. Therefore, the only way to reduce mercury intake is to reduce the amount of contaminated fish you eat.

Click on the page
to move forward

CHLORDANE AND PCB ADVISORY

The following fish advisory is for eating trimmed and skinned fish (except smelt). The advice in this table has been developed to protect infants, children and women of child bearing age. The advice may be over protective for women beyond child bearing age and adult men.

Water	Fish Species	1 Meal/week	1 Meal/month	6 Meals/year	Do Not Eat
BORDER WATERS					
Lake Michigan (P)	Chinook Salmon Coho Salmon Lake Whitefish Rainbow Trout Brown Trout Lake Trout Yellow Perch Smelt Channel Catfish Carp	Less than 22" All Sizes All Sizes	Less than 30" All Sizes All Sizes Larger than 22" Less than 22" Less than 23"	Larger than 30" Larger than 22" 23" to 27"	Larger than 27" All Sizes All Sizes
Mississippi River (P) Ohio River Ohio River/Essex Pool 15 Pool 18 Lock and Dam 22 to Cairo	Channel Catfish Carp Carp Sturgeon	Less than 18" All Sizes All Sizes All Sizes	Larger than 18" All Sizes All Sizes All Sizes		
Ohio River (P)	Channel Catfish Blue Catfish Carp Dum Sauger Largemouth Bass (see special mercury advisory)	Larger than 15" All Sizes Less than 14"	All Sizes Larger than 14" All Sizes		
Wabash River (P)	Carp Channel Catfish Chub White Bass	All Sizes Larger than 18" All Sizes All Sizes	All Sizes		
LAKES					
Bessemer Lake (P)	Carp Rock Basshead Channel Catfish	All Sizes All Sizes	All Sizes		
Catahoula Lake (P) (Southern Illinois U.)	Bluegill Largemouth Bass (see special mercury advisory)	All Sizes			
Crab Orchard Lake (P) East of Wolf Creek Road East of Wolf Creek Road East of Wolf Creek Road West of Wolf Creek Road West of Wolf Creek Road West of Wolf Creek Road	Largemouth Bass Channel Catfish Carp Largemouth Bass Channel Catfish Carp	Less than 18"	All Sizes Less than 22" All Sizes Larger than 18" All Sizes All Sizes	Larger than 22"	
Fox Chen-O-Lakes (P)	Channel Catfish Carp	Larger than 18" All Sizes			
Frank Hoffman State Lakes (P)	Largemouth Bass Channel Catfish	Larger than 14" All Sizes			
Highland Silver Lake (C)	Channel Catfish	Larger than 20"			
Horseshoe Lake (P) (Madison County)	Carp Channel Catfish	Less than 20" All Sizes	Larger than 20"		
Lake Brewster (P)	Largemouth Bass Channel Catfish Carp	All Sizes All Sizes All Sizes	Larger than 18" Larger than 18" All Sizes		
Lake Calumet (P)	Largemouth Bass Carp	Less than 14"	Larger than 14" All Sizes		
Lake Decatur (P,C)	Channel Catfish Carp	All Sizes All Sizes			
Lake Taylorville (C)	Channel Catfish	All Sizes			
Madison Reservoir (P)	Carp		Larger than 15"		
Powerline Lake (P)	Channel Catfish	15" to 18"	Larger than 18"		
Seagrasshose Slough (P)	Channel Catfish	Larger than 18"			
Schiller Pond (P)	Carp	All Sizes			

(C) = Listed due to Chlordane contamination

(P) = Listed due to Polychlorinated Biphenyl (PCB) contamination

Additional information about Fish Advisories in Illinois can be found on the Illinois Dept. of Public Health website:
<http://www.idph.state.il.us/enr/health/factsheets/fishadv.htm>

Methyl Mercury

Mercury is found in the environment because of natural and human activities. When moving through the environment, mercury goes through a series of complex changes. Through these changes in lake and river sediments, an organic form of mercury, methyl mercury, is created. Methyl mercury is very persistent in the environment. Methyl mercury is transferred up the food chain to predator species, and can accumulate in people that eat these predator fish.

Methyl mercury is extremely toxic to humans and causes many adverse health effects. Health effects associated with eating methyl mercury-contaminated fish include impaired central nervous system function, kidney damage and failure, and gastro-intestinal damage with higher methyl mercury exposure, and development delays in children with lower exposure. A recent report by the National Academy of Sciences concluded that the population at highest risk for adverse health effects is the children of women who eat large amounts of fish and seafood during pregnancy. This is due to the greater sensitivity of the developing nervous system of infants.

In order to protect the most sensitive populations, pregnant or nursing women, women of childbearing age, and children less than 15 years of age are advised to eat no more than one meal per week of predator fish. This advisory is based on recent studies of families in several countries that eat many meals of fish having various amounts of methyl mercury, along with the most recent mercury data from predator fish at sample points throughout the state. Predator fish include all species of black bass (largemouth, smallmouth, and spotted), striped bass, white bass, hybrid striped bass, walleye, sauger, saugeye, flathead catfish, muskellunge, and northern pike. Since women beyond childbearing age and males over 15 years of age are at less risk for the effects of methyl mercury, these groups may continue to enjoy as many meals of predator fish as they please, except as noted below.

A few bodies of water have been found to have fish with higher levels of methyl mercury than in waters from the rest of the state. These waters require more restrictive meal advice than the general advice given above. The special advice is listed in the following table.

Meal Advice for Eating Sport Fish From Illinois Waters

- ✳ Measure fish from the tip of the nose to the tip of the tail.
- ✳ One meal a week (52 meals per year), one meal a month (12 meals per year) and one meal every two months (six meals per year) is advice for how long to wait before eating your next meal of sport fish.
- ✳ Do not eat means no one should eat those fish because of very high contamination. (Note that the amount of contamination in a fish listed on the One meal a month group is four times higher than the amount of contamination in a fish listed in the One meal a week group.)
- ✳ One meal is assumed to be one-half pound of fish (weight before cooking) for a 150-pound person. The meal advice is equally protective for larger people who eat larger meals and smaller people who eat smaller meals.
- ✳ Follow cooking and cleaning directions given above to prepare fish.

SPECIAL MERCURY ADVISORY

Due to levels of mercury greater than what has been found in most predator fish in Illinois, the following bodies of water require more restrictive consumption advice.

Water	Fish Species	Advice for	
		women beyond childbearing age, males more than 15 years old	pregnant or nursing women, women of childbearing age, children less than 15 years old
Ohio River	Largemouth Bass (all sizes)	1 meal/week	1 meal/month
Rock River (Rockford to Milan Steel Dam)	Flathead Catfish larger than 20"	1 meal/week	1 meal/month
Arrowhead Lake (Cook County)	Largemouth Bass (all sizes)	1 meal/week	1 meal/month
Carpenters Lake (Southern Illinois University)	Largemouth Bass (all sizes)	1 meal/week	1 meal/month
Cedar Lake (Jackson County)	Largemouth Bass (all sizes) White Crappie (all sizes)	1 meal/week unlimited	1 meal/month 1 meal/week
Devil's Kitchen Lake (Williamson County)	Largemouth Bass (all sizes)	1 meal/week	1 meal/month
Grind Lake (Jackson County)	Largemouth Bass (all sizes) White Crappie (all sizes)	1 meal/week unlimited	1 meal/month 1 meal/week
Lake in the Hills (Montgomery County)	Largemouth Bass larger than 15"	1 meal/week	1 meal/month
Midlothian Reservoir (Cook County)	Largemouth Bass larger than 14"	1 meal/week	1 meal/month
Monroe Reservoir (Will County)	Largemouth Bass (all sizes)	1 meal/week	1 meal/month

[illegible]

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DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

**RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)**

Migration of Contaminated Groundwater Under Control

Facility Name: Solutia Inc.
Facility Address: 500 Monsanto Ave., Sauget, IL 62206-1198
Facility EPA ID #: ILD 000 802 702

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

 X If yes - check here and continue with #2 below.
 If no - re-evaluate existing data, or
 if data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators for the RCRA Corrective Action

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration/Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

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2. Is **groundwater** known or reasonably suspected to be "**contaminated**"¹ above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

- X If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.
- If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."
- If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

The following information is presented in the *Description of Current Conditions (August 1, 2000)*, CA750 *Migration of Contaminated Groundwater Under Control*, W.G. Krummrich Plant, Sauget, IL (December 2002), and a September 30, 2003, letter from Solutia to EPA:

A large groundwater contaminant plume containing VOCs and SVOCs is present beneath the entire facility and extends beyond the western facility boundary to the Mississippi River, a distance of approximately 2800-feet. The size of the facility plume was determined to be approximately 3,900-feet wide and 6,900-feet long. It is controlled at its westernmost extent, before it can wholly discharge to the Mississippi River, by a slurry barrier wall and three-well extraction system (groundwater barrier/control system). Collected groundwater is routed to the American Bottoms Regional Treatment Facility. Maximum contaminant concentrations detected in the plume at and from the facility and corresponding Illinois EPA TACO groundwater remediation objectives are:

¹ "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

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<i>Groundwater Contaminant</i>	<i>Maximum Concentration (ppb)</i>	<i>Illinois EPA TACO Groundwater Remediation Objective (ppb)</i>
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<i>Volatile Organics</i>		
Acetone	22,000	700
Benzene	1,600,000	5
Chlorobenzene	350,000	100
1,2-DCA	14,000	5
1,2-DCE	420	70
Ethylbenzene	29,000	700
Methylene chloride	680	5
4-methyl-2-pentanone	3,100	560
1,1,1-TCA	560	200
Toluene	71,000	100
Xylenes	150,000	10,000
Vinyl chloride	350	2

<i>Semi-volatile Organics</i>		
Aniline	62,000	23
4-chloroaniline	25,000	28
2-chlorophenol	540,000	35
Dichlorobenzenes	23,000,000	75
2,4-dichlorophenol	340,000	21
Methylphenols	280,000	350
2-nitroaniline	1,100	6.3
Nitrobenzene	14,000	3.5
Naphthalene	86,000	140
Pentachlorophenol	18,000	1
Phenol	1,100,000	100
1,2,4-trichlorobenzene	1,400	70
2,4,6-trichlorophenol	2,700	10

Migration of Contaminated Groundwater Under Control
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3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"² as defined by the monitoring locations designated at the time of this determination)?

- ☒ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"²).
- ☐ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"²) - skip to #8 and enter "NO" status code, after providing an explanation.
- ☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

The contaminant plume is present in the shallow (20-feet thick), middle (30-feet thick), and deep (40-feet thick) hydrogeologic units (sand and gravel). The plume migrates westward to the Mississippi River where it is effectively captured by a groundwater barrier/control system. The groundwater barrier/control system currently captures most contaminants in all three units before they discharge to the Mississippi River and maintains hydraulic control of the core of the plume (*CA 750 Groundwater Migration Control Addendum, W.G. Krummrich Plant, Sauget, Illinois*. April 19, 2004. Solutia Inc.) The deep hydrogeologic unit is underlain by bedrock which restricts any downward migration.

The facility contaminant plume commingles with other contaminant plumes originating from surrounding industries and historical disposal areas (CERCLA Sauget Area Sites 1 and 2). Therefore, it is difficult to map the exact extent of the subject facility plume. However, area monitoring wells and a geoprobe study were used to generate VOC and SVOC plume boundary maps (Letter from Solutia to EPA, September 30, 2003). Contaminated groundwater is expected to remain within this defined existing area of contamination because groundwater flow and discharge patterns are controlled by the Mississippi River and Solutia has installed a groundwater barrier/control system to capture the core of the plume before it discharges to the river.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

- ☒ If yes - continue after identifying potentially affected surface water bodies.
- ☐ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an

² "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

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explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

With the construction of the groundwater barrier/control system, the core of the contaminant plume that previously discharged to the Mississippi River and impacted surface water and sediment has been effectively cut-off. Solutia demonstrated hydraulic control of the plume in its *CA 750 Groundwater Migration Control Addendum, W.G. Krummrich Plant, Sauget, Illinois* (April 19, 2004).

However, in its September 30, 2003, letter to EPA, Solutia predicts that a portion of the plume (the northern, less-contaminated area) still discharges up to 2100-feet north of the groundwater barrier/control system. No monitoring wells are installed at the river to confirm this prediction due to access restrictions. This northern portion of the plume likely commingles with source areas being addressed in the CERCLA Sauget Area 2 Sites (e.g., Site P).

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be "**insignificant**" (i.e., the maximum concentration³ of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

_____ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration³ of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

X If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration³ of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations³ greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown - enter "IN" status code in #8.

³ As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

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Rationale and Reference(s):

An interpretation of the VOC and SVOC plume boundary maps (Solutia letter to EPA, September 30, 2003) shows that VOCs north of the assumed capture zone of the groundwater barrier/control system are less than 10 ppm (VOCs captured in the core of the plume are typically 100 to 1000 ppm). SVOCs north of the assumed capture zone of the groundwater barrier/control system are typically in the hundred-ppb range (SVOCs captured in the core of the plume are typically in the 300 to 1100 ppm range). These concentrations, although much lower than those captured by the groundwater barrier/control system, generally exceed 10 times their appropriate groundwater "level" (Illinois EPA TACO groundwater remediation objective).

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented⁴)?

 X If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,⁵ appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

 If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

⁴ Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

⁵ The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

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_____ If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s):

The following information is presented in an EPA letter to Solutia dated February 9, 2001, and the *Human Health Risk Assessment, Sauget Area 2, Sauget, Illinois, Volumes I and II* (August 31, 2003).

Sampling events for Mississippi River water and sediment were conducted in November 2000 and November 2002. River levels at the time of each sampling event were relatively low (approx. 382 to 383-feet) and the groundwater barrier/control system was not installed. These conditions are representative of a worse-case scenario when groundwater discharge impacts to the river would be expected to be more significant. The sample area in November 2000 was 500-feet north of the current groundwater barrier/control system. Three locations were sampled along a transect 50, 150, and 300-feet from the riverbank. The sample area in November 2002 was 1200 to 1900-feet north of the current groundwater barrier/control system. Two or three locations were sampled along three transects that were 50 and 150-feet, or 50, 150, and 300-feet from the riverbank. No VOCs, SVOCs, pesticides, and herbicides were detected at any of the sample locations during these worse-case sampling events. This is contrary to areas sampled further downstream in the vicinity of the groundwater barrier/control system where significant concentrations of VOCs, SVOCs, pesticides, and herbicides were detected in surface water and sediment. This area is now protected by the groundwater barrier/control system. The absence of detectable contaminant concentrations in Mississippi River water and sediment north of the groundwater barrier/control system demonstrates that the discharge of potentially contaminated groundwater not captured by the groundwater barrier/control system is currently acceptable.

7. Will groundwater **monitoring**/measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

 X If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

_____ If no - enter "NO" status code in #8.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

The following information is presented in the *Groundwater Migration Control System, Sauget Area 2 Superfund Site, Remedial Design/Remedial Action Workplan* (URS, July 3, 2003) and *DNAPL Characterization and Site Corrective Measures Study Workplan, Solutia Inc., W.G. Krummrich Plant, Sauget, Illinois* (Groundwater Services, Inc., February 18, 2004).

Numerous monitoring programs are in place to verify that contaminated groundwater remains within its existing dimensions. For the groundwater barrier/control system that captures the majority of contaminants at the river, piezometer, monitoring well, and river level measurements are made to ensure that hydraulic control is maintained (i.e., groundwater flow is inward across the slurry wall). Four monitoring well nests between the slurry wall and the river will also be sampled to determine the amount of contaminant mass

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discharging to the river. In addition, upon completion of the slurry wall this year, Solutia is required to monitor river water and sediment to determine impacts to the river.

The possibility for DNAPL exists at the facility. Solutia has implemented a workplan to characterize DNAPL and conduct a corrective measures study. The work includes measurement of DNAPL in monitoring wells, a geophysical survey to define the bedrock valley, and additional borings/wells installed at preferential DNAPL migration areas down to the bedrock. The investigations will be completed in the summer of 2004. At that time, the data will be evaluated to determine if DNAPL is present and if it is stabilized within the existing area of groundwater contamination.

The facility contaminant plume commingles with other contaminant plumes originating from surrounding industries and historical disposal areas (CERCLA Sauget Area Sites 1 and 2). Therefore, it is difficult to map and monitor the exact extent of the subject plume. Area monitoring wells and a geoprobe study were used to generate VOC and SVOC plume boundary maps (Letter from Solutia to EPA, September 30, 2003). Numerous wells exist on the facility property and additional wells have been installed at the facility plume perimeter and within the off-site portion of the facility plume as part of the CERCLA investigations. Specific monitoring wells screened in all three hydraulic units at the perimeter of the facility boundary and apparent perimeter (north and south) of the facility plume will be chosen to monitor the contaminant plume. Because of the likelihood of commingling with other plumes, the purpose of this program will be to ensure that contamination at the defined edges of the facility contaminant plume remain within a certain range. The groundwater barrier/control system, along with hydraulic and chemical monitoring of groundwater and surface water/sediment will be used to effectively monitor the western extent of the plume.

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8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

 X YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Solutia Inc. facility, EPA ID Number ILD 000 802 702, located at Sauget, Illinois. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

 NO - Unacceptable migration of contaminated groundwater is observed or expected.

 IN - More information is needed to make a determination.

Completed by (signature) Kenneth S. Bardo Date May 26, 2004
(print) Kenneth S. Bardo
(title) Environmental Scientist

Supervisor (signature) George J. Hamper Date May 26, 2004
(print) George Hamper
(title) Section Chief
(EPA Region or State) Region 5

Locations where References may be found:

RCRA 7th Floor File room - Administrative Record for RCRA 3008(h) Consent Order.

Contact telephone and e-mail numbers

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